APPENDIX K
IMPOUNDMENTS BADCT DESIGN REPORT

GUNNISON COPPER PROJECT
M3-PN140129

Prepared for

EXCELSIOR MINING ARIZONA, INC.

January 2016

ARCHITECTURE
ENGINEERING
CONSTRUCTION MANAGEMENT

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FIGURES

EXHIBITS

1 INTRODUCTION

1.1 Overview

The Gunnison Project is located about 62 miles east of Tucson, Arizona on the southeastern flank of the Little Dragoon Mountains in the Cochise Mining District. The property is within the copper porphyry belt of Arizona. The Gunnison deposit contains copper mineralization.

Excelsior proposes to recover copper through In Situ Recovery (ISR) of the deposit. ISR is a closed loop mining system, where ground water from the aquifer is utilized as the transport medium. Metals are dissolved in place within the host formations using a dilute sulfuric acid solution (the raffinate). Patterns of screened and cased bore holes or wells are used to deliver the raffinate to the ore horizon enabling it to contact the fracture-controlled mineralization whilst passing through the aquifer. Similarly, patterns of recovery or extraction wells fitted with pumps extract the copper-rich raffinate, also known as pregnant leach solution (PLS) to the surface for processing. After processing, the solution is re-acidified and recycled to the well field to begin the copper recovery cycle again. Thus, ISR takes place on a continuous mining basis.

PLS from the wellfield is processed through solvent extraction (SX) which increases the grade of the aqueous solution through a two-step ion exchange process. The upgraded solution, or electrolyte, is pumped into the electrowinning (EW) plant, where the copper in solution is plated out on stainless steel cathode blanks. The process requires various ponds for storage and/or treatment of process solutions.

The Gunnison Copper Project shall begin production at a rate of 25 million pounds of copper cathode per year (MM lb/yr). This initial production level shall be referred to as Stage 1. Two planned expansion steps are proposed; first to 75 MM lb/yr, and second, to 125 MM lb/yr. These subsequent production levels shall be referred to as Stage 2 and Stage 3, respectively.

Excelsior Mining Corporation has acquired the existing Johnson Camp Mine (JCM) with its existing SX/EW plant, various ponds, and support facilities. These existing JCM facilities will be utilized for Stage 1 production of copper. Thus, no new ponds are proposed at the Gunnison Project site for Stage 1 operations. The existing ponds at JCM are outside the scope of this report.

This report discusses the design of the plant process and evaporation impoundments (ponds) required for the ultimate production capability of 125 MM lb/yr. Ponds will be constructed at the Gunnison site to accommodate the increased flows that result as the wellfield and plant facilities are expanded for Stage 2 production levels.

The pond facilities, which include process solution ponds and non-stormwater ponds, are designed using prescriptive BADCT (Best Available Demonstrated Control Technology) criteria as discussed in the Arizona Mining BADCT Guidance Manual (BADCT Manual, ADEQ, 2004). The sections of this report were ordered to follow the topics/sections in the

BADCT Manual for ease of review. This design has been developed to meet or exceed all applicable guidelines and standards contained in USFS, ADEQ, and EPA regulations.

The design drawings and this design report are prepared and submitted to present the design of demonstrated control technologies (i.e. BADCT) and are not intended to present detail to the level necessary for construction of these facilities.

2 RAFFINATE POND

2.1 Facility Description

The Raffinate Pond is located east of and down-gradient from the Plant. The Raffinate Pond was designed to meet prescriptive BADCT requirements for environmental protection. The Raffinate Pond is the primary storage component for raffinate solution that will be introduced into the ore resource through various injection wells. As such, it will be managed as a Process Solution Pond.

Raffinate solution for Stage 1 production will be circulated through the JCM solvent extraction facility at a design flow rate of 3,874 gpm and be stored in an existing pond at the JCM site.

For Stage 2 production, the Raffinate Pond shall be designed to hold a minimum 12-hour supply of raffinate circulated through the Gunnison solvent extraction facility consistent with 50 MM lb/yr copper production (75 MM lb/yr – the 25 MM lb/yr processed at JCM).

For Stage 3 production, the Raffinate Pond shall be designed to hold a minimum 8-hour supply of raffinate circulated through the Gunnison solvent extraction facility consistent with 100 MM lb/yr copper production (125 MM lb/yr – the 25 MM lb/yr processed at JCM).

The Stage 3 criterion is the more restrictive of the two. The Stage 3 recirculating rate of 15,497 gpm therefore requires a minimum of 7.44 million gallons or 22.83 acre feet of solution storage.

The Raffinate Pond will be a double-lined surface impoundment with leak detection between the upper and lower liners. Vertical turbine pumps, installed in vertical pipe casings, will transfer raffinate into a pipeline network for distribution as needed into the wellfield.

Details for the Raffinate Pond are included in the Figures at the end of the report. Plan and section views are shown on Dwg. 350-CI-002. Pond and liner details are shown on Dwg. 350-CI-009.

2.2 Authorized and Unauthorized Materials

The Raffinate Pond will normally receive raffinate solution from SX facilities, sulfuric acid from tank storage, fresh water make-up, wellfield conditioning water and rinse water (from the Recycled Water Pond, see Section 4.2), and direct precipitation. Raffinate will, as a normal course of operations, include some entrained organic phase (diluent and extractant). This organic phase is a lighter density and will float in a thin layer on the surface of the pond, having very limited contact with the pond liner. Organic phase is routinely skimmed from the surface and returned to the process. The Raffinate Pond may also receive sump pump discharge from the acid unloading/storage area, and the tank farm area. The Tank Farm Floor Sump receives discharge from the Electrowinning Area Sump as well as any leaks or spills from tanks within the tank farm area. Thus trace amounts of guar gum and cobalt sulfate (EW reagents) may be present. There will be no discharge of unauthorized materials such as solid waste, garbage, etc., to the Raffinate Pond.

2.3 Site Selection

The site was selected by M3 Engineering personnel during basic engineering efforts for the Project. The Raffinate Pond was purposefully located down-gradient and east of the Plant Site within a low area in order to be in position to receive overflow, by gravity, from the Tank Farm Floor Sump.

2.4 Site Characterization

The Raffinate Pond is located within a local drainage depression. Groundwater was not encountered in any of 16 geotechnical exploration boreholes drilled across the project area. Borehole depths ranged from 20 to 60 feet below ground surface (BGS). In addition, hydrogeologic characterization work has shown that groundwater is several hundred feet BGS. Therefore, groundwater is not expected to be encountered during construction excavation. Vegetation at the site consists of a sparse coverage of native grasses, occasional shrubs, and creosote.

The Raffinate Pond is underlain by several hundred feet of basin fill deposits consisting of moderately to strongly consolidated conglomerate and sandstone. Also included are lesser amounts of mudstone, siltstone, limestone, and gypsum. These deposits are generally light gray or tan. They commonly form high rounded hills and ridges in modern basins, and locally form prominent bluffs. Deposits of this unit are widely exposed in the dissected basins of southeastern and central Arizona. Bedrock was not encountered in boring B-8 within the footprint of the Raffinate Pond. Soils are expected to be rippable where excavations for construction are necessary.

2.5 Surface Water Control

The Raffinate Pond will be an excavated pond with elevated perimeter embankments. Surface flows will be directed around the pond. Potential contact water from the plant site will be directed to the Plant Runoff Pond. In the unlikely event of an overflow from the Raffinate Pond, the solution would flow into the Plant Runoff Pond.

The Raffinate Pond can contain direct precipitation from the 100-year design storm event. Therefore, no spillway is proposed. The Raffinate Pond will be maintained such that two (2) feet of freeboard is maintained below the crest elevation.

The Raffinate Pond is not located within a FEMA 100-year floodplain but may be impacted by drainage flows. Pond embankment slopes subject to concentrated drainage flows will be protected to minimize erosion.

2.6 Geologic Hazards

There are no known geologic hazards in the vicinity of the Raffinate Pond.

2.7 Solution Characterization

The Raffinate Pond will typically contain raffinate, sulfuric acid, water, and minor amounts of entrained organic reagents. It will also provide containment of sump pump discharge from several areas of the SX/EW Plant Site which could potentially contain reagents. Safety Data Sheets of potential reagents used in the SX/EW processes are presented in Appendix L. Reagents, acids, and other materials stored at the Plant Site will be properly managed so as not to discharge. The reagents are discussed here because they may be present in trace amounts. Solutions will be at ambient temperature.

Chemical characteristics of the raffinate are expected to be similar to the raffinate from the nearby Johnson Camp Mine. Johnson Camp raffinate has been characterized, as discussed in Section 6 and Appendix J.1 of the APP Application.

2.8 Capacity and Storage Design

The Raffinate Pond will be sized to provide 8 hours of process flow requirements for the ultimate design, plus an additional 20% of this process volume, while maintaining two (2) feet of freeboard. The additional 20% volume is a buffer to handle any flow variations during start-up, transition to expanded production levels, solution volume from pipes or equipment drained for maintenance, or unplanned process upsets. This additional 20% volume is also sufficient to include the volume of the 100-year, 24-hour design storm entering the pond from direct precipitation.

The volume requirements for the Raffinate Pond are presented in Table 2.1.

Table 2.1 Raffinate Pond Volume Requirements

8 Hours Process Volume (ft^3)	Additional 20% Process Volume (ft^3)	Two (2) Feet Freeboard Volume (ft^3)	Total Volume Required (ft^3)	Total Volume Provided (ft^3)
994,330 (7.44 M Gal) 22.83 AF	198,865 (1.49 M Gal) 4.56 AF	181,310 (90,655 ft^2 x 2 feet) 4.16 AF	1,374,505 (31.55 AF)	1,412,893 (32.43 AF)

2.9 Site Preparation

The ground will be cleared of vegetation, grubbed, and stripped of topsoil and debris. Topsoil will be salvaged for use in reclamation. Native soils will be excavated and graded as necessary to the elevations specified in the detailed design. Areas that will receive controlled fill, structural fill, or support structures will be scarified, moisture conditioned, and compacted. Any unsuitable foundation material within the pond footprint will be excavated and replaced as necessary. The top six inches of prepared subgrade shall be compacted to a minimum of 95% of the maximum dry density as determined by Standard Proctor methods (ASTM D-698).

The Raffinate Pond lies on a naturally well-draining slope. However, the area will need to be excavated and graded. The side slopes of the pond will be graded to a 2.5:1 H:V slope in compliance with BADCT guidance.

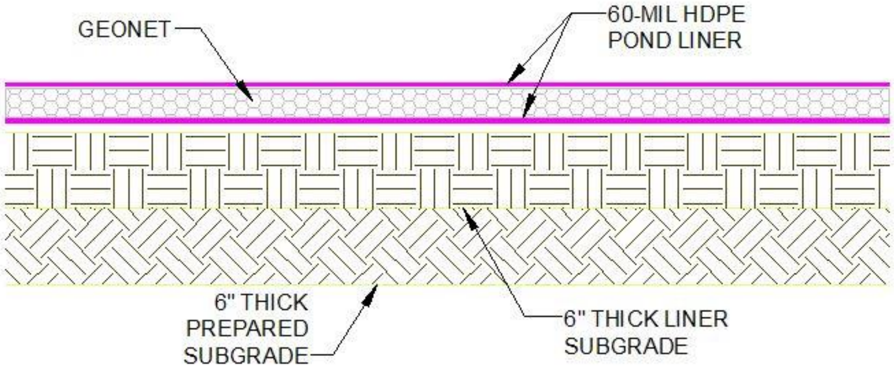
2.10 Liner System

The Raffinate Pond liner system will consist of the following (from bottom to top):

- A minimum six (6) inch thick layer of properly compacted native or natural material (prepared subgrade);
- A minimum six (6) inch thick layer of 3/8” minus native or natural material compacted to achieve a saturated hydraulic conductivity no greater than 10^{-6} cm/s (Liner Subgrade);
- A 60-mil HDPE geomembrane lower (secondary) liner;
- A minimum 200 mil HDPE Geonet leak collection layer: and
- A 60-mil HDPE geomembrane upper (primary) liner.

A cross section of the liner system for the Raffinate Pond is presented in Illustration 2.1.

Illustration 2.1 Raffinate Pond Liner System



All ground surfaces will be rolled and inspected prior to liner installation. A quality assurance/quality control (QA/QC) program will be implemented as part of the construction of this facility and will comply with the BADCT Manual for liner installation, operation, and maintenance.

Typical liner details are shown on Dwg. 350-CI-009 in the Figures at the end of this report.

The HDPE geonet and geomembrane liner materials are chemically compatible with the authorized solutions to be contained within the pond. The geomembrane liner shall be certified UV resistant for areas exposed to sunlight.

2.11 Perimeter Containment

The perimeter embankments of the Raffinate Pond will be elevated relative to adjacent ground in order to prevent inflow of surface drainage. The geosynthetic liner system shall be secured in an engineered anchor trench located within the flat area adjacent to the top of the interior pond slopes. The anchor trench shall be continuous around the entire perimeter of the pond.

2.12 Leak Collection and Removal System

A Leak Collection and Removal System (LCRS) is proposed for the Raffinate Pond. The proposed Geonet layer will drain to a collection sump where a dedicated, automatic, fluid-level activated pump within perforated pipe will withdraw any collected leakage and return it to the Raffinate Pond. The pond floor will have a minimum 3% slope to promote drainage to the collection sump.

The head on the secondary liner will be maintained at low levels so that potential leakage will be minimized. The sump pump will return solutions to the pond, and flow volume will be measured and recorded. If leakage volumes exceed the Alert Level (as calculated in Appendix O), the contingency plan shall be implemented.

Typical details for the LCRS for the Raffinate Pond are shown on Dwg. 350-CI-009 in the Figures at the end of this report.

2.13 Stability Design

The Raffinate Pond embankment height is less than 20 feet. Therefore the pond is not subject to the requirement to demonstrate stability.

2.14 Performance Inspections and Operational Monitoring

Routine facility inspections of the Raffinate Pond will be instituted at the time of construction and will proceed quarterly with additional inspections in the event of a process upset or a major storm/surface water flow event. All inspections will take the form of a visual assessment of integrity along with a physical appraisal of the pond capacity. Inspection records will remain onsite for a period prescribed in the APP. Additionally, a contingency plan has been developed and will be implemented in the event of an accidental discharge. The contingency plan concept is presented in Section 10 of the APP Application (Clear Creek, 2015).

Liquid level in the LCRS sump will be measured weekly. The LCRS pump will be tested weekly. If solutions are pumped from the LCRS sump back to the Raffinate Pond, the volume will be measured with a flow meter.

2.15 Closure Strategy

The Raffinate Pond will be closed per prescriptive BADCT criteria for an excavated process solution pond. Any solid residue on the liner greater than 1/4 inch thick which can be readily removed, by sweeping or high pressure water sprays, will be removed and disposed of as appropriate. The upper liner will be inspected for holes, tears, or defective seams that could have leaked. If there is no evidence of a breach of the upper liner, and plant operational data demonstrate an absence of solution in the LCRS, it can be concluded that no leaks occurred. In this case, the upper liner, geonet, and lower liner will be folded in toward the center of the pond and covered by backfilling the excavation. Folds may be cut to encourage the materials to lie flat.

Otherwise, the upper liner and geonet will be removed for offsite recycling or burial onsite. The bottom liner will then be inspected for holes, tears, or defective seams that could have leaked. Where defects are found, the liner will be cut away in that location and the underlying soils will be visually inspected for signs of contamination. Sampling and analysis of the material may be necessary to determine the potential threat to groundwater quality and, if necessary, soil remediation will be conducted to prevent groundwater contamination. After the soil conditions have been approved by ADEQ, the bottom liner will be folded in toward the center of the pond and covered by backfilling the excavation. The Raffinate Pond area will be graded to drain surface run-off and minimize infiltration. The area will be reseeded as appropriate.

3 PLS POND

3.1 Facility Description

The PLS Pond is located south of the Plant and adjacent to the northeast edge of the ore resource and wellfield. The PLS Pond was designed to meet prescriptive BADCT requirements for environmental protection. The PLS Pond is the primary storage component for PLS solution withdrawn from the ore resource through various recovery wells. As such, it will be managed as a Process Solution Pond.

PLS solution for Stage 1 production will be circulated through the JCM solvent extraction facility at a rate of 3,874 gpm and be stored in an existing pond at the JCM site.

For Stage 2 production, the PLS Pond shall be designed to hold a minimum 12-hour supply of PLS circulated through the Gunnison solvent extraction facility consistent with 50 MM lb/yr copper production.

For Stage 3 production, the PLS Pond shall be designed to hold a minimum 8-hour supply of PLS circulated through the Gunnison solvent extraction facility consistent with 100 MM lb/yr copper production.

The Stage 3 criteria is the more restrictive of the two. The Stage 3 recirculating rate of 15,497 gpm therefore requires a minimum of 7.44 million gallons or 22.83 acre feet of solution storage.

The PLS Pond will be a double-lined surface impoundment with leak detection between the upper and lower liners. Vertical turbine pumps, installed in vertical pipe casings, will transfer raffinate into a pipeline for delivery to the SX facility.

Details for the PLS Pond are included in the Figures at the end of the report. Plan and section views are shown on Dwg. 350-CI-003. Pond and liner details are shown on Dwg. 350-CI-009.

3.2 Authorized and Unauthorized Materials

The PLS Pond will normally receive PLS solution from the wellfield, a very small bleed stream of electrolyte, and direct precipitation. There will be no discharge of unauthorized materials such as solid waste, garbage, etc., to the PLS Pond.

3.3 Site Selection

The site was selected by M3 Engineering personnel during basic engineering efforts for the Project. The PLS Pond was located near to the wellfield and adjacent to the main pipe corridor.

3.4 Site Characterization

The PLS Pond is located within a local hill structure to allow natural drainage to continue to flow around the pond in an adjacent depression to the north. Groundwater was not encountered in any of 16 geotechnical exploration boreholes drilled across the project area. Borehole depths ranged from 20 to 60 feet below ground surface (BGS). Therefore, groundwater is not expected to be encountered during construction excavation. Vegetation at the site consists of a sparse coverage of native grasses, occasional shrubs, and creosote.

The PLS Pond is underlain by basin fill deposits consisting of moderately to strongly consolidated conglomerate and sandstone. Also included are lesser amounts of mudstone, siltstone, limestone, and gypsum. These deposits are generally light gray or tan. They commonly form high rounded hills and ridges in modern basins, and locally form prominent bluffs. Deposits of this unit are widely exposed in the dissected basins of southeastern and central Arizona. Bedrock was not encountered in boring B-10 within the footprint of the PLS Pond. Soils are expected to be rippable where excavations for construction are necessary.

3.5 Surface Water Control

The PLS Pond will be an excavated pond with elevated perimeter embankments. Surface flows will be directed around the pond. Potential contact water from the plant site will be directed to the Plant Runoff Pond. In the unlikely event of an overflow from the PLS Pond, the solution would flow in diversion ditches and be routed to the Plant Runoff Pond.

The PLS Pond can contain direct precipitation from the 100-year design storm event. Therefore, no spillway is proposed. The PLS Pond will be maintained such that two (2) feet of freeboard is maintained below the crest elevation.

The PLS Pond is not located within a 100-year floodplain.

3.6 Geologic Hazards

There are no known geologic hazards in the vicinity of the PLS Pond.

3.7 Solution Characterization

The PLS Pond will typically contain PLS and precipitation that falls directly into the pond. Safety Data Sheets of potential reagents used in the SX/EW processes are presented in Appendix L. Reagents, acids, and other materials stored at the Plant Site will be properly managed so as not to discharge. The reagents are discussed here because they may be present in trace amounts. Solutions will be at ambient temperature or slightly cooler since they would have recently been recovered from the cooler subterranean formations.

Chemical characteristics of the PLS are expected to be similar to the PLS from the nearby Johnson Camp Mine. Johnson Camp PLS has been characterized, as discussed in Section 6 and Appendix J.1.

3.8 Capacity and Storage Design

The PLS Pond will be sized to provide 8 hours of process flow requirements for the ultimate design, plus an additional 20% of this process volume, while maintaining two (2) feet of freeboard. The additional 20% volume is a buffer to handle any flow variations during start-up, transition to expanded production levels, solution volume from pipes or equipment drained for maintenance, or unplanned process upsets. This additional 20% volume is also sufficient to include the volume of the 100-year, 24-hour design storm entering the pond from direct precipitation.

The volume requirements for the PLS Pond are presented in Table 3.1.

Table 3.1 PLS Pond Volume Requirements

8 Hours Process Volume (ft^3)	Additional 20% Process Volume (ft^3)	Two (2) Feet Freeboard Volume (ft^3)	Total Volume Required (ft^3)	Total Volume Provided (ft^3)
994,330 (7.44 M Gal) 22.83 AF	198,865 (1.49 M Gal) 4.56 AF	181,310 (90,655 ft^2 x 2 feet) 4.16 AF	1,374,505 (31.55 AF)	1,412,893 (32.43 AF)

3.9 Site Preparation

The ground will be cleared of vegetation, grubbed, and stripped of topsoil and debris. Topsoil will be salvaged for use in reclamation. Native soils will be excavated and graded as necessary to the elevations specified in the detailed design. Areas that will receive controlled fill, structural fill, or support structures will be scarified, moisture conditioned, and compacted. Any unsuitable foundation material within the pond footprint will be excavated and replaced as necessary. The top six inches of prepared subgrade shall be compacted to a minimum of 95% of the maximum dry density as determined by Standard Proctor methods (ASTM D-698).

The PLS Pond lies on a naturally well-draining slope. However, the area will need to be excavated and graded. The side slopes of the pond will be graded to a 2.5:1 H:V slope in compliance with BADCT guidance.

3.10 Liner System

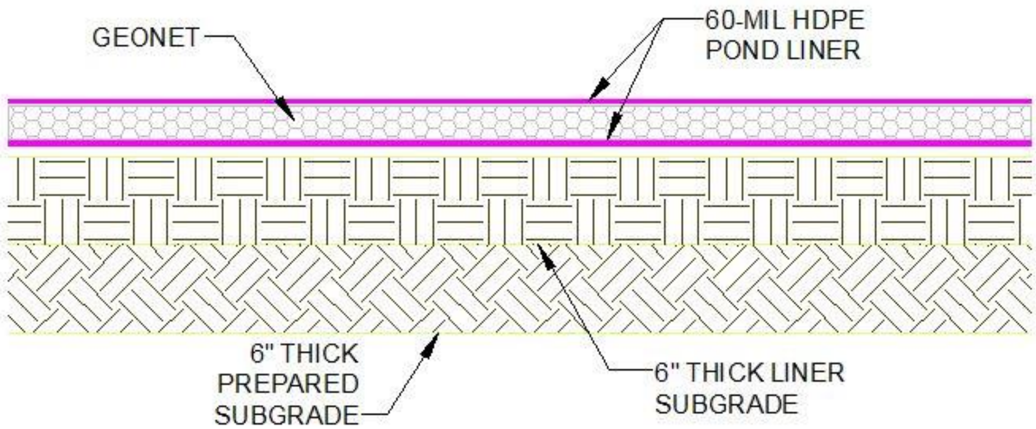
The PLS Pond liner system will consist of the following (from bottom to top):

- A minimum six (6) inch thick layer of properly compacted native or natural material (prepared subgrade);

- A minimum six (6) inch thick layer of 3/8” minus native or natural material compacted to achieve a saturated hydraulic conductivity no greater than 10^{-6} cm/s (Liner Subgrade);
- A 60-mil HDPE geomembrane lower (secondary) liner;
- A minimum 200 mil HDPE Geonet leak collection layer: and
- A 60-mil HDPE geomembrane upper (primary) liner.

A cross section of the liner system for the PLS Pond is presented in Illustration 3.1.

Illustration 3.1 PLS Pond Liner System



All ground surfaces will be rolled and inspected prior to liner installation. A quality assurance/quality control (QA/QC) program will be implemented as part of the construction of this facility and will comply with the BADCT Manual for liner installation, operation, and maintenance.

Typical liner details are shown on Dwg. 350-CI-009 in the Figures at the end of this report.

The HDPE geonet and geomembrane liner materials are chemically compatible with the authorized solutions to be contained within the pond. The geomembrane liner shall be certified UV resistant for areas exposed to sunlight.

3.11 Perimeter Containment

The perimeter embankments of the PLS Pond will be elevated relative to adjacent ground in order to prevent inflow of surface drainage. The geosynthetic liner system shall be secured in an engineered anchor trench located within the flat area adjacent to the top of the interior pond slopes. The anchor trench shall be continuous around the entire perimeter of the pond.

3.12 Leak Collection and Removal System

A Leak Collection and Removal System (LCRS) is proposed for the PLS Pond. The proposed Geonet layer will drain to a collection sump where a dedicated pump within perforated pipe will withdraw any collected leakage and return it to the PLS Pond. The pond floor will have a minimum 3% slope to promote drainage to the collection sump.

The head on the secondary liner will be maintained at low levels so that potential leakage will be minimized. The sump pump will return solutions to the pond, and flow volume will be measured and recorded. If leakage volumes exceed the Alert Level (as calculated in Appendix O), the contingency plan shall be implemented.

Typical details for the LCRS for the PLS Pond are shown on Dwg. 350-CI-009 in the Figures at the end of this report.

3.13 Stability Design

The proposed design of the PLS Pond has been analyzed for stability by Terracon Consultants, Inc. The results of the stability analysis are included in Exhibit K-1 of this report.

The results of the analysis show that the PLS Pond static and pseudo-static factors of safety against failure are adequate under normal operating conditions and with an unsaturated or saturated foundation.

3.14 Performance Inspections and Operational Monitoring

Routine facility inspections of the PLS Pond will be instituted at the time of construction and will proceed quarterly with additional inspections in the event of a process upset or a major storm/surface water flow event. All inspections will take the form of a visual assessment of integrity along with a physical appraisal of the pond capacity. Inspection records will remain onsite for a period prescribed in the APP. Additionally, a contingency plan will be developed and implemented in the event of an accidental discharge. The contingency plan concept is presented in Section 10 of the APP Application (Clear Creek, 2015).

Liquid level in the LCRS sump will be measured weekly. The LCRS pump will be tested weekly. If solutions are pumped from the LCRS sump back to the PLS Pond, the volume will be measured with a flow meter.

3.15 Closure Strategy

The PLS Pond will be closed per prescriptive BADCT criteria for an excavated process solution pond. Any solid residue on the liner greater than 1/4 inch thick which can be readily removed, by sweeping or high pressure water sprays, will be removed and disposed of as appropriate. The upper liner will be inspected for holes, tears, or defective seams that could have leaked. If there is no evidence of a breach of the upper liner, and plant operational data demonstrate an absence of solution in the LCRS, it can be concluded that no leaks occurred. In this case, the upper liner, geonet, and lower liner will be folded in toward the center of the pond and covered by backfilling the excavation. Folds may be cut to encourage the materials to lie flat.

Otherwise, the upper liner and geonet will be removed for offsite recycling or burial onsite. The bottom liner will then be inspected for holes, tears, or defective seams that could have leaked. Where defects are found, the liner will be cut away in that location and the underlying soils will be visually inspected for signs of contamination. Sampling and analysis of the material may be necessary to determine the potential threat to groundwater quality and, if necessary, soil remediation will be conducted to prevent groundwater contamination. After the soil conditions have been approved by ADEQ, the bottom liner will be folded in toward the center of the pond and covered by backfilling the excavation. The PLS Pond area will be graded to drain surface run-off and minimize infiltration. The area will be reseeded as appropriate.

4 RECYCLED WATER POND

4.1 Facility Description

The Recycled Water Pond is located southeast of and down-gradient from the Plant. The Recycled Water Pond was designed to meet prescriptive BADCT requirements for environmental protection. The Recycled Water Pond is the primary storage component for solutions in transition. Often the solution in the pond could be considered a diluted PLS. As such, it will be managed as a Process Solution Pond.

Recycled solutions from the wellfield, for Stage 1 production, will be sent to a tank at the Gunnison site, and then pumped to existing ponds at the JCM site. Some solution may also be returned directly to the wellfield.

For Stage 2 production, the Recycled Water Pond shall be designed to hold a minimum 8-hour supply of the maximum flow of solutions through the pond. The maximum flow is 1,716 gpm and occurs in year 15. This recirculating rate therefore requires a minimum of 825,000 gallons or 2.53 acre feet of solution storage.

For Stage 3 production, the Gunnison plant will be expanded to 100 MM lb/yr copper production. However no additional pond volume is required as the maximum flowrate through the pond occurs during Stage 2 operations.

The Recycled Water Pond will be a double-lined surface impoundment with leak detection between the upper and lower liners. Vertical turbine pumps, installed in vertical pipe casings, will transfer pond solutions into a pipeline network for distribution to their destinations.

Details for the Recycled Water Pond are included in the Figures at the end of the report. Plan and section views are shown on Dwg. 350-CI-004. Pond and liner details are shown on Dwg. 350-CI-009.

4.2 Authorized and Unauthorized Materials

The Recycled Water Pond will normally receive wellfield conditioning water, rinse water, hydraulic control water, direct precipitation, and transferred stormwater accumulated within the Plant Runoff Pond. Wellfield conditioning water is ground water from newly commissioned areas of the wellfield extracted during the span of time necessary for injected raffinate to migrate to the recovery wells. As such, its composition ranges from clean groundwater to weak PLS solution. Rinse water is ground water extracted from decommissioned areas of the wellfield. As recoverable copper diminishes below economically viable concentrations, wells in that area of the wellfield will be injected with clean water in order to rinse the aquifer. As the rinse cycle begins, the initial “first flush” will be full strength PLS and will be directed to the PLS Pond. Subsequent flush volumes will be diluted PLS solutions and will be directed to the Recycled Water Pond. Hydraulic control water is clean ground water from wells on the perimeter of the wellfield. The Recycled Water Pond will also receive transferred stormwater accumulated within the Plant Runoff Pond. Since the Plant Runoff Pond is potentially a contact water pond, trace amounts of process reagents may be present. There will be no discharge of unauthorized materials such as solid waste, garbage, etc., to the Recycled Water Pond.

4.3 Site Selection

The site was selected by M3 Engineering personnel during basic engineering efforts for the Project. The Recycled Water Pond was located near to the wellfield and adjacent to the main pipe corridor.

4.4 Site Characterization

The Recycled Water Pond is located on the side of a hill structure, outside of a local drainage depression. Groundwater was not encountered in any of 16 geotechnical exploration boreholes drilled across the project area. Borehole depths ranged from 20 to 60 feet below ground surface (BGS). In addition, hydrogeologic characterization work has shown that groundwater is several hundred feet BGS. Therefore, groundwater is not expected to be encountered during construction excavation. Vegetation at the site consists of a sparse coverage of native grasses, occasional shrubs, and creosote.

The Recycled Water Pond is underlain by several hundred feet of basin fill deposits consisting of moderately to strongly consolidated conglomerate and sandstone. Also included are lesser amounts of mudstone, siltstone, limestone, and gypsum. These deposits are generally light gray or tan. They commonly form high rounded hills and ridges in modern basins, and locally form prominent bluffs. Deposits of this unit are widely exposed in the dissected basins of southeastern and central Arizona. Bedrock was not encountered in nearby boring B-9. Soils are expected to be rippable where excavations for construction are necessary.

4.5 Surface Water Control

The Recycled Water Pond will be an excavated pond with elevated perimeter embankments. Surface flows will be directed around the pond. The Recycled Water Pond can contain direct precipitation from the 100-year design storm event. Therefore, no spillway is proposed. The Recycled Water Pond will be maintained such that two (2) feet of freeboard is maintained below the crest elevation.

The Recycled Water Pond is not located within a 100-year floodplain.

4.6 Geologic Hazards

There are no known geologic hazards in the vicinity of the Recycled Water Pond.

4.7 Solution Characterization

The Recycled Water Pond will typically contain wellfield conditioning water, rinse water, hydraulic control water, direct precipitation, and transferred stormwater accumulated within the Plant Runoff Pond. As such, its composition ranges from clean groundwater to weak PLS. Solutions will tend to be mildly to moderately acid and will be at ambient temperature.

4.8 Capacity and Storage Design

The Recycled Water Pond will be sized to provide 8 hours of the maximum process flow requirements (expected in year 15), plus an additional 20% of this process volume, while maintaining two (2) feet of freeboard. The additional 20% volume is a buffer to handle any flow variations during start-up, transition to expanded production levels, solution volume from pipes or equipment drained for maintenance, or unplanned process upsets. This additional 20% volume is also sufficient to include the volume of the 100-year, 24-hour design storm entering the pond from direct precipitation.

The volume requirements for the Recycled Water Pond are presented in Table 4.1.

Table 4.1 Recycled Water Pond Volume Requirements

8 Hours Process Volume (ft^3)	Additional 20% Process Volume (ft^3)	Two (2) Feet Freeboard Volume (ft^3)	Total Volume Required (ft^3)	Total Volume Provided (ft^3)
110,100 (0.82 M Gal) 2.53 AF	22,020 (0.16 M Gal) 0.51 AF	39,220 (19,610 ft^2 x 2 feet) 0.90 AF	171,340 (3.93 AF)	179,617 (4.12 AF)

4.9 Site Preparation

The ground will be cleared of vegetation, grubbed, and stripped of topsoil and debris. Topsoil will be salvaged for use in reclamation. Native soils will be excavated and graded as necessary to the elevations specified in the detailed design. Areas that will receive controlled fill, structural fill, or support structures will be scarified, moisture conditioned, and compacted. Any unsuitable foundation material within the pond footprint will be excavated and replaced as necessary. The top six inches of prepared subgrade shall be compacted to a minimum of 95% of the maximum dry density as determined by Standard Proctor methods (ASTM D-698).

The Recycled Water Pond lies on a naturally well-draining slope. However, the area will need to be excavated and graded. The side slopes of the pond will be graded to a 2.5:1 H:V slope in compliance with BADCT guidance.

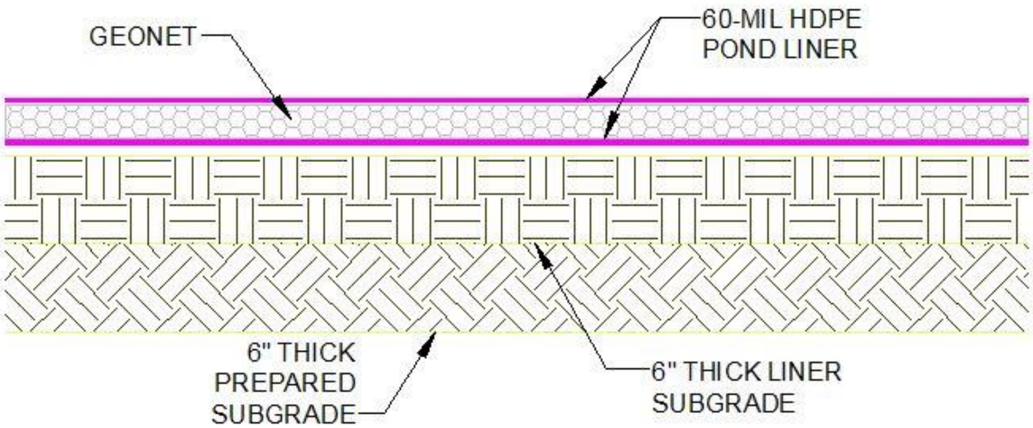
4.10 Liner System

The Recycled Water Pond liner system will consist of the following (from bottom to top):

- A minimum six (6) inch thick layer of properly compacted native or natural material (prepared subgrade);
- A minimum six (6) inch thick layer of 3/8” minus native or natural material compacted to achieve a saturated hydraulic conductivity no greater than 10^{-6} cm/s (Liner Subgrade);
- A 60-mil HDPE geomembrane lower (secondary) liner;
- A minimum 200 mil HDPE Geonet leak collection layer: and
- A 60-mil HDPE geomembrane upper (primary) liner.

A cross section of the liner system for the Recycled Water Pond is presented in Illustration 4.1.

Illustration 4.1 Recycled Water Pond Liner System



All ground surfaces will be rolled and inspected prior to liner installation. A quality assurance/quality control (QA/QC) program will be implemented as part of the construction of this facility and will comply with the BADCT Manual for liner installation, operation, and maintenance.

Typical liner details are shown on Dwg. 350-CI-009 in the Figures at the end of the report.

The HDPE geonet and geomembrane liner materials are chemically compatible with the authorized solutions to be contained within the pond. The geomembrane liner shall be certified UV resistant for areas exposed to sunlight.

4.11 Perimeter Containment

The perimeter embankments of the Recycled Water Pond will be elevated relative to adjacent ground in order to prevent inflow of surface drainage. The geosynthetic liner system shall be secured in an engineered anchor trench located within the flat area adjacent to the top of the interior pond slopes. The anchor trench shall be continuous around the entire perimeter of the pond.

4.12 Leak Collection and Removal System

A Leak Collection and Removal System (LCRS) is proposed for the Recycled Water Pond. The proposed Geonet layer will drain to a collection sump where a dedicated pump within perforated pipe will withdraw any collected leakage and return it to the Recycled Water Pond. The pond floor will have a minimum 3% slope to promote drainage to the collection sump.

The head on the secondary liner will be maintained at low levels so that potential leakage will be minimized. The sump pump will return solutions to the pond, and flow volume will be measured and recorded. If leakage volumes exceed the Alert Level (as calculated in Appendix O), the contingency plan shall be implemented.

Typical details for the LCRS for the Recycled Water Pond are shown on Dwg. 350-CI-009 in the Figures at the end of the report.

4.13 Stability Design

The Recycled Water Pond embankment height is less than 20 feet. Therefore the pond is not subject to the requirement to demonstrate stability.

4.14 Performance Inspections and Operational Monitoring

Routine facility inspections of the Recycled Water Pond will be instituted at the time of construction and will proceed quarterly with additional inspections in the event of a process upset or a major storm/surface water flow event. All inspections will take the form of a visual assessment of integrity along with a physical appraisal of the pond capacity. Inspection records will remain onsite for a period prescribed in the APP. Additionally, a contingency plan has been developed and will be implemented in the event of an accidental discharge. The contingency plan concept is presented in Section 10 of the APP Application (Clear Creek, 2015).

Liquid level in the LCRS sump will be measured weekly. The LCRS pump will be tested weekly. If solutions are pumped from the LCRS sump back to the Recycled Water Pond, the volume will be measured with a flow meter.

4.15 Closure Strategy

The Recycled Water Pond will be closed per prescriptive BADCT criteria for an excavated process solution pond. Any solid residue on the liner greater than 1/4 inch thick which can be readily removed, by sweeping or high pressure water sprays, will be removed and disposed of as appropriate. The upper liner will be inspected for holes, tears, or defective seams that could have leaked. If there is no evidence of a breach of the upper liner, and plant operational data demonstrate an absence of solution in the LCRS, it can be concluded that no leaks occurred. In this case, the upper liner, geonet, and lower liner will be folded in toward the center of the pond and covered by backfilling the excavation. Folds may be cut to encourage the materials to lie flat.

Otherwise, the upper liner and geonet will be removed for offsite recycling or burial onsite. The bottom liner will then be inspected for holes, tears, or defective seams that could have leaked. Where defects are found, the liner will be cut away in that location and the underlying soils will be visually inspected for signs of contamination. Sampling and analysis of the material may be necessary to determine the potential threat to groundwater quality and, if necessary, soil remediation will be conducted to prevent groundwater contamination. After the soil conditions have been approved by ADEQ, the bottom liner will be folded in toward the center of the pond and covered by backfilling the excavation. The Recycled Water Pond area will be graded to drain surface run-off and minimize infiltration. The area will be reseeded as appropriate.

5 EVAPORATION POND

5.1 Facility Description

The Evaporation Pond is located southeast of and down-gradient from the Plant and PLS Pond, and south of the Recycled Water Pond and future water treatment facilities. The Evaporation Pond was designed to meet prescriptive BADCT requirements for environmental protection. The Evaporation Pond is the primary storage component and location for the evaporation of excess water from the process. It will primarily receive solution from the Recycled Water Pond, and will therefore be managed as a Process Solution Pond. Evaporation shall be achieved by use of mechanical evaporators.

Evaporation of low pH solutions that are high in total dissolved solids (TDS) will generate precipitates. The pH will be controlled by the addition of lime. Lime addition will also generate precipitates. For an analysis of the water chemistry and precipitates expected, refer to Appendix J.3.

For Stage 1 production, solution evaporation will be achieved from within existing ponds at the JCM site.

For Stage 2 production, the Evaporation Pond shall evaporate excess water from solutions circulated through the 50 MM lb/yr Stage 2 plant at the Gunnison site. Prior to the construction of the Water Treatment Plant and the Solids Impoundment in Stage 3, the precipitates formed will be stored in the Evaporation Pond. During Stage 3 production, the majority of precipitates formed will be sent to the Solids Impoundment. However, some precipitates will still be formed within the Evaporation Pond during this final stage.

Therefore the Evaporation Pond must be constructed to hold the accumulated volume of precipitates generated from Stage 2 and Stage 3 evaporation, and from interim lime addition during Stage 2 operations. In addition, the pond volume shall include a 4-foot deep active liquid solution layer that will ensure reliable operation of the mechanical evaporators.

The Evaporation Pond will be a double-lined surface impoundment with leak detection between the upper and lower liners. Details for the Evaporation Pond are included in the Figures at the end of the report. Plan and section views are shown on Dwg. 350-CI-005. Pond and liner details are shown on Dwg. 350-CI-009.

5.2 Authorized and Unauthorized Materials

The Evaporation Pond will normally receive solutions from the Recycled Water Pond (see Section 4.2 for more detail), direct precipitation, lime addition, and brine water from the reverse osmosis equipment within the water treatment plant. Since the Evaporation Pond is the terminal element for solutions from other upstream process ponds, trace amounts of process reagents may be present. There will be no discharge of unauthorized materials such as solid waste, garbage, etc., to the Evaporation Pond.

5.3 Site Selection

The site was selected by M3 Engineering personnel during basic engineering efforts for the Project. The Evaporation Pond was located near to the Recycled Water Pond and future water treatment plant, but in an open area, remote from other plant facilities.

5.4 Site Characterization

The Evaporation Pond is located within a wide local depression between hill structures to the north and south, in order to promote more favorable earthwork quantities due to its greater depth and size compared to other process ponds, and to provide some protection from wind effects on the operation of the mechanical evaporators. Groundwater was not encountered in any of 16 geotechnical exploration boreholes drilled across the project area. Borehole depths ranged from 20 to 60 feet below ground surface (BGS). In addition, hydrogeologic characterization work has shown that groundwater is several hundred feet BGS. Therefore, groundwater is not expected to be encountered during construction excavation. Vegetation at the site consists of a sparse coverage of native grasses, occasional shrubs, and creosote.

The Evaporation Pond is underlain by several hundred feet of basin fill deposits consisting of moderately to strongly consolidated conglomerate and sandstone. Also included are lesser amounts of mudstone, siltstone, limestone, and gypsum. These deposits are generally light gray or tan. They commonly form high rounded hills and ridges in modern basins, and locally form prominent bluffs. Deposits of this unit are widely exposed in the dissected basins of southeastern and central Arizona. Bedrock was not encountered in nearby boring B-11. Soils are expected to be rippable where excavations for construction are necessary.

5.5 Surface Water Control

The Evaporation Pond will be an excavated pond with elevated perimeter embankments. Surface flows will be directed around the pond. The Evaporation Pond can contain direct precipitation from the 100-year design storm event. Therefore, no spillway is proposed. The Evaporation Pond will be maintained such that two (2) feet of freeboard is maintained below the crest elevation.

The Evaporation Pond is not located within a FEMA 100-year floodplain but may be impacted by drainage flows. Pond embankment slopes subject to concentrated drainage flows will be protected to minimize erosion.

5.6 Geologic Hazards

There are no known geologic hazards in the vicinity of the Evaporation Pond.

5.7 Solution Characterization

The Evaporation Pond will typically contain mild to moderately acidic aqueous solutions with high TDS in saturation as well as increasing accumulations of precipitates settled on the bottom or in suspension. In the final several years, the only inputs to the pond will be hydraulic control water from the Recycled Water Pond, direct precipitation, and brine water from the reverse osmosis equipment within the water treatment plant. Solutions will be at ambient temperature or slightly lower than ambient due to the cooling effect of the evaporation.

For an analysis of the water chemistry and precipitates expected, refer to Appendix J.3.

5.8 Capacity and Storage Design

The Evaporation Pond is designed to hold the accumulated volume of precipitates generated from Stage 2 and Stage 3 evaporation, and from interim lime addition during Stage 2 operations. In addition, the pond volume shall include a minimum 3-foot deep active liquid solution layer that will ensure reliable operation of the mechanical evaporators. (The design will provide for a 4-foot deep layer). The volume of the 100-year, 24-hour design storm entering the pond from direct precipitation can easily be accommodated. The freeboard level will not be approached until the final year of operation. During the last two years, relatively few evaporators will be required and the 4-foot planned depth of the active liquid solution layer can be decreased slightly to accommodate the design storm event.

The volume requirements for the Evaporation Pond are presented in Table 5.1.

Table 5.1 Evaporation Pond Volume Requirements

Accumulated Precipitate Volume (ft^3)	3-foot Liquid Solution Volume (ft^3)	Two (2) Feet Freeboard Volume (ft^3)	Total Volume Required (ft^3)	Total Volume Provided (ft^3)
3,962,790 (29.65 M Gal) 90.97 AF	663,750 (4.97 M Gal) 15.24 AF	476,170 (238,085 ft^2 x 2 feet) 10.93 AF	5,102,710 (117.14 AF)	5,318,022 (122.08 AF)

5.9 Site Preparation

The ground will be cleared of vegetation, grubbed, and stripped of topsoil and debris. Topsoil will be salvaged for use in reclamation. Native soils will be excavated and graded as necessary to the elevations specified in the detailed design. Areas that will receive controlled fill, structural fill, or support structures will be scarified, moisture conditioned, and compacted. Any unsuitable foundation material within the pond footprint will be excavated and replaced as necessary. The top six inches of prepared subgrade shall be compacted to a minimum of 95% of the maximum dry density as determined by Standard Proctor methods (ASTM D-698).

The Evaporation Pond lies on a naturally well-draining slope. However, the area will need to be excavated and graded. The side slopes of the pond will be graded to a 2.5:1 H:V slope in compliance with BADCT guidance.

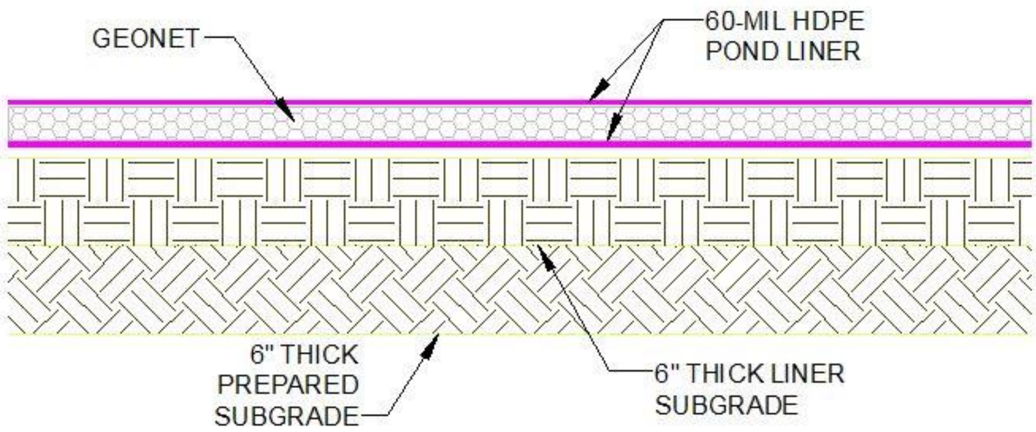
5.10 Liner System

The Evaporation Pond liner system will consist of the following (from bottom to top):

- A minimum six (6) inch thick layer of properly compacted native or natural material (prepared subgrade);
- A minimum six (6) inch thick layer of 3/8” minus native or natural material compacted to achieve a saturated hydraulic conductivity no greater than 10^{-6} cm/s (Liner Subgrade);
- A 60-mil HDPE geomembrane lower (secondary) liner;
- A minimum 200 mil HDPE Geonet leak collection layer: and
- A 60-mil HDPE geomembrane upper (primary) liner.

A cross section of the liner system for the Evaporation Pond is presented in Illustration 5.1.

Illustration 5.1 Evaporation Pond Liner System



All ground surfaces will be rolled and inspected prior to liner installation. A quality assurance/quality control (QA/QC) program will be implemented as part of the construction of this facility and will comply with the BADCT Manual for liner installation, operation, and maintenance.

Typical liner details are shown on Dwg. 350-CI-009 in the Figures at the end of the report.

The HDPE geonet and geomembrane liner materials are chemically compatible with the authorized solutions to be contained within the pond. The geomembrane liner shall be certified UV resistant for areas exposed to sunlight.

5.11 Perimeter Containment

The perimeter embankments of the Evaporation Pond will be elevated relative to adjacent ground in order to prevent inflow of surface drainage. A diversion channel will be constructed to route run-on drainage around the south side of the pond. The geosynthetic liner system shall be secured in an engineered anchor trench located within the flat area adjacent to the top of the interior pond slopes. The anchor trench shall be continuous around the entire perimeter of the pond.

5.12 Leak Collection and Removal System

A Leak Collection and Removal System (LCRS) is proposed for the Evaporation Pond. The proposed Geonet layer will drain to a collection sump where a dedicated pump within perforated pipe will withdraw any collected leakage and return it to the Evaporation Pond. The pond floor will have a minimum 3% slope to promote drainage to the collection sump.

The head on the secondary liner will be maintained at low levels so that potential leakage will be minimized. The sump pump will return solutions to the pond, and flow volume will be measured and recorded. If leakage volumes exceed the Alert Level (as calculated in Appendix O), the contingency plan shall be implemented.

Typical details for the LCRS for the Evaporation Pond are shown on Dwg. 350-CI-009 in the Figures at the end of the report.

5.13 Stability Design

The Evaporation Pond embankment height is greater than 20 feet. The proposed design of the Evaporation Pond has been analyzed for stability by Terracon Consultants, Inc. The results of the stability analysis are included in Exhibit K-1 of this report.

The results of the analysis show that the PLS Pond static and pseudo-static factors of safety against failure are adequate under normal operating conditions and with an unsaturated or saturated foundation.

5.14 Performance Inspections and Operational Monitoring

Routine facility inspections of the Evaporation Pond will be instituted at the time of construction and will proceed quarterly with additional inspections in the event of a process upset or a major storm/surface water flow event. All inspections will take the form of a visual assessment of integrity along with a physical appraisal of the pond capacity. Inspection records will remain onsite for a period prescribed in the APP. Additionally, a contingency plan has been developed and will be implemented in the event of an accidental discharge. The contingency plan concept is presented in Section 10 of the APP Application (Clear Creek, 2015).

Liquid level in the LCRS sump will be measured weekly. The LCRS pump will be tested weekly. If solutions are pumped from the LCRS sump back to the Evaporation Pond, the volume will be measured with a flow meter.

5.15 Closure Strategy

The Evaporation Pond contains solids in quantity and thickness that require that they be closed in place. Closure will begin after all process ponds, tanks, and containment areas have been rinsed and closed.

The Evaporation Pond liner will be removed from the anchor trenches and folded inward to partially cover the sediments after they have been dewatered and dried sufficiently to support earth moving equipment. The excavation will be backfilled and the area graded flat.

A low permeability cover will be placed over the entire footprint of the pond to limit infiltration. The cover design and surface configuration will limit infiltration and surface ponding. Low permeability components of the cover will be protected from damage or erosion by the use of vegetative cover to minimize potential maintenance needs, and enhance cover longevity.

6 SOLIDS IMPOUNDMENTS

6.1 Facility Description

The Solids Impoundments are located northeast of and down-gradient from the Plant. The Solids Impoundments were designed to meet prescriptive BADCT requirements for environmental protection. The Solids Impoundments are the primary storage component for densified precipitates formed within the Water Treatment Plant using the high density solids (HDS) process and unit operations including lime addition, clarification/thickening, and reverse osmosis reclamation of water for return to the mining process. They will primarily receive densified precipitate slurry solution from the Water Treatment Plant. The Solids Impoundments are considered settling/storage surface impoundments for the evaluation of BADCT.

For Stage 1 and Stage 2 production, there will be no Water Treatment Plant and therefore no generation of densified solids. Precipitates formed by evaporation will be stored in the Evaporation Pond (see Section 5).

The Water Treatment Plant and the Solids Impoundments will be constructed for use in Stage 3 production. The impoundments will be constructed with two cells each to provide operational flexibility in the management of solutions and to provide the ability to allow one cell to rest, thereby promoting a greater settled density of solids within the cell.

The majority of precipitates formed during Stage 3 will be sent to the Solids Impoundments. However, some precipitates will still be formed within the Evaporation Pond during this final stage. The Solids Impoundments must be constructed to hold the accumulated volume of densified precipitates generated from the Water Treatment Plant.

It is expected that a supernatant pond will form above the densified solids within the Solids Impoundments. Decant water from these supernatant ponds will be pumped to the Water Treatment Plant for return to the mining process.

The Solids Impoundments will be double-lined surface impoundments with leak detection between the upper and lower liners. Details for the Solids Impoundments are included in the Figures at the end of the report. Plan and section views are shown on Dwgs. 350-CI-006 & 007. Pond and liner details are shown on Dwg. 350-CI-009.

6.2 Authorized and Unauthorized Materials

The Solids Impoundments will normally receive densified precipitates from the Water Treatment Plant, and direct precipitation. Since the Solids Impoundments are the terminal elements for solutions from other upstream process ponds, trace amounts of process reagents may be present. There will be no discharge of unauthorized materials such as solid waste, garbage, etc., to the Solids Impoundments.

6.3 Site Selection

The site was selected by M3 Engineering personnel during basic engineering efforts for the Project. The Solids Impoundments requires a large area and were therefore located north of the process plant, south of Interstate 10, in the northeast corner of the land section.

6.4 Site Characterization

The Solids Impoundments are located on the descending slopes north of the plant site. There is no appreciable upgradient watershed or run-on channels. Groundwater was not encountered in any of 16 geotechnical exploration boreholes drilled across the project area. Borehole depths ranged from 20 to 60 feet below ground surface (BGS). In addition, hydrogeologic characterization work has shown that groundwater is several hundred feet BGS. Therefore, groundwater is not expected to be encountered during construction excavation. Vegetation at the site consists of a sparse coverage of native grasses, occasional shrubs, and creosote.

The Solids Impoundments are underlain by several hundred feet of basin fill deposits consisting of moderately to strongly consolidated conglomerate and sandstone. Also included are lesser amounts of mudstone, siltstone, limestone, and gypsum. These deposits are generally light gray or tan. They commonly form high rounded hills and ridges in modern basins, and locally form prominent bluffs. Deposits of this unit are widely exposed in the dissected basins of southeastern and central Arizona. Bedrock was not encountered in nearby borings B-2 and B-3. Soils are expected to be rippable where excavations for construction are necessary.

6.5 Surface Water Control

The Solids Impoundments will be excavated ponds with elevated perimeter embankments. Surface flows, if any, will be directed around the ponds. The Solids Impoundments can contain direct precipitation from the 100-year design storm event. Therefore, no spillway is proposed. The Solids Impoundments will be maintained such that two (2) feet of freeboard is maintained below the crest elevation.

The Solids Impoundments are not located within a 100-year floodplain.

6.6 Geologic Hazards

There are no known geologic hazards in the vicinity of the Solids Impoundments.

Solution Characterization

The Solids Impoundments will typically contain mildly acidic aqueous solutions with high TDS in saturation as well as increasing accumulations of densified precipitates settled on the bottom or in suspension. Solutions will be at ambient temperature.

For an analysis of the water chemistry and precipitates expected, refer to Appendix J.3.

6.7 Capacity and Storage Design

The Solids Impoundments are designed to hold the accumulated volume of precipitates generated from the Water Treatment Plant operated during Stage 3 production. These precipitates enter the Solids Impoundments as a thickened slurry of solids and aqueous solution. The required pond volume is determined from the volumetric flowrate irrespective of the solid, slurry, or liquid state of the material. The volume of the 100-year, 24-hour design storm entering the pond from direct precipitation will also be accommodated. The freeboard level will not be approached until the final year of operation of each impoundment.

The volume requirements for the Solids Impoundments are presented in Tables 6.1 and 6.2.

Table 6.1 Solids Impoundment #1 Volume Requirements

Accumulated Precipitate Slurry Volume (ft^3)	Two (2) Feet Freeboard Volume (ft^3)	Total Volume Required (ft^3)	Total Volume Provided (ft^3)
13,872,750 (103.78 M Gal) 318.47 AF	1,203,630 (590,850 ft^2 x 2 feet) 27.13 AF	15,076,380 (346.11 AF)	15,362,270 (352.67 AF)

Table 6.2 Solids Impoundment #2 Volume Requirements

Accumulated Precipitate Slurry Volume (ft^3)	Two (2) Feet Freeboard Volume (ft^3)	Total Volume Required (ft^3)	Total Volume Provided (ft^3)
13,872,750 (103.78 M Gal) 318.47 AF	1,203,630 (590,850 ft^2 x 2 feet) 27.13 AF	15,076,380 (346.11 AF)	15,362,270 (352.67 AF)

6.8 Site Preparation

The ground will be cleared of vegetation, grubbed, and stripped of topsoil and debris. Topsoil will be salvaged for use in reclamation. Native soils will be excavated and graded as necessary to the elevations specified in the detailed design. Areas that will receive controlled fill, structural fill, or support structures will be scarified, moisture conditioned, and compacted. Any unsuitable foundation material within the pond footprint will be excavated and replaced as necessary. The top six inches of prepared subgrade shall be compacted to a minimum of 95% of the maximum dry density as determined by Standard Proctor methods (ASTM D-698).

The Solids Impoundments lie on a naturally well-draining slope. However, the area will need to be excavated and graded. The side slopes of the pond will be graded to a 2.5:1 H:V slope in compliance with BADCT guidance.

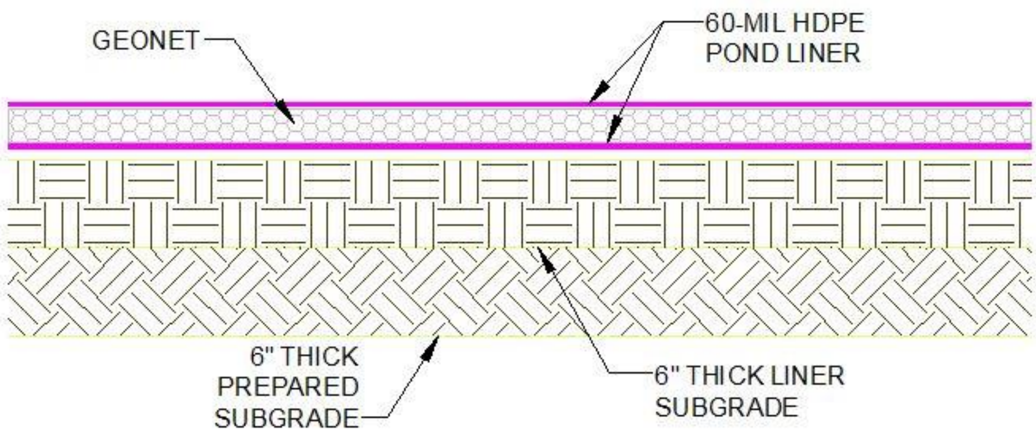
6.9 Liner System

The Solids Impoundment liner system will consist of the following (from bottom to top):

- A minimum six (6) inch thick layer of properly compacted native or natural material (prepared subgrade);
- A minimum six (6) inch thick layer of 3/8" minus native or natural material compacted to achieve a saturated hydraulic conductivity no greater than 10^{-6} cm/s (Liner Subgrade);
- A 60-mil HDPE geomembrane lower (secondary) liner;
- A minimum 200 mil HDPE Geonet leak collection layer: and
- A 60-mil HDPE geomembrane upper (primary) liner.

A cross section of the liner system for the Solids Impoundments is presented in Illustration 6.1.

Illustration 6.1 Solids Impoundment Liner System



All ground surfaces will be rolled and inspected prior to liner installation. A quality assurance/quality control (QA/QC) program will be implemented as part of the construction of this facility and will comply with the BADCT Manual for liner installation, operation, and maintenance.

Typical liner details are shown on Dwg. 350-CI-009 in the Figures at the end of the report.

The HDPE geonet and geomembrane liner materials are chemically compatible with the authorized solutions to be contained within the pond. The geomembrane liner shall be certified UV resistant for areas exposed to sunlight.

6.10 Perimeter Containment

The perimeter embankments of the Solids Impoundments will typically be elevated relative to adjacent ground in order to prevent inflow of surface drainage. A diversion channel will be constructed to route run-on drainage around the south side of the pond. The geosynthetic liner system shall be secured in an engineered anchor trench located within the flat area adjacent to the top of the interior pond slopes. The anchor trench shall be continuous around the entire perimeter of the pond.

6.11 Leak Collection and Removal System

A Leak Collection and Removal System (LCRS) is proposed for each cell of the Solids Impoundments. The proposed Geonet layer will drain to a collection sump where a dedicated pump within perforated pipe will withdraw any collected leakage and return it to the Solids Impoundment. The pond floor will have a minimum 3% slope to promote drainage to the collection sump.

The head on the secondary liner will be maintained at low levels so that potential leakage will be minimized. The sump pump will return solutions to the pond, and flow volume will be measured and recorded. If leakage volumes exceed the Alert Level (as calculated in Appendix O), the contingency plan shall be implemented.

Typical details for the LCRS for the Solids Impoundments are shown on Dwg. 350-CI-009 in the Figures at the end of the report.

6.12 Stability Design

The Solids Impoundments embankment heights are greater than 20 feet. The proposed design of the Solids Impoundments has been analyzed for stability by Terracon Consultants, Inc. The results of the stability analysis are included in Exhibit K-1 of this report.

The results of the analysis show that the Solids Impoundment static and pseudo-static factors of safety against failure are adequate under normal operating conditions and with an unsaturated or saturated foundation.

6.13 Performance Inspections and Operational Monitoring

Routine facility inspections of the Solids Impoundments will be instituted at the time of construction and will proceed quarterly with additional inspections in the event of a process upset or a major storm/surface water flow event. All inspections will take the form of a visual assessment of integrity along with a physical appraisal of the pond capacity. Inspection records will remain onsite for a period prescribed in the APP. Additionally, a contingency plan has been developed and will be implemented in the event of an accidental discharge. The contingency plan concept is presented in Section 10 of the APP Application (Clear Creek, 2015).

Liquid level in the LCRS sump will be measured weekly. The LCRS pump will be tested weekly. If solutions are pumped from the LCRS sump back to the Solids Impoundment, the volume will be measured with a flow meter.

6.14 Closure Strategy

The Solids Impoundments contains solids in quantity and thickness that require that they be closed in place. Closure will begin after all process ponds, tanks, and containment areas have been rinsed and closed.

The Solids Impoundment liner will be removed from the anchor trenches and folded inward to partially cover the sediments after they have been dewatered and dried sufficiently to support earth moving equipment. The excavation will be backfilled and the area graded flat.

A low permeability cover will be placed over the entire footprint of the impoundment to limit infiltration. The cover design and surface configuration will limit infiltration and surface ponding. Low permeability components of the cover will be protected from damage or erosion by the use of vegetative cover to minimize potential maintenance needs, and enhance cover longevity.

7 PLANT RUNOFF POND

7.1 Facility Description

The Plant Runoff Pond is located southeast of and down-gradient from the Plant. The Plant Runoff Pond was designed to meet prescriptive BADCT requirements for a non-stormwater pond.

The Plant Runoff Pond will be a single-lined surface impoundment that will receive direct precipitation and stormwater run-off from the processing plant area. The Plant Runoff Pond will be normally empty to maintain maximum available storage volume for stormwater run-off. As currently designed, the Plant Runoff Pond provides containment of the 100-year, 24-hour storm event originating from the watershed that encompasses the process plant.

A centrifugal pump on the perimeter of the Plant Runoff Pond will pump stormwater to the Recycled Water Pond.

Details for the Plant Runoff Pond are included in the Figures at the end of the report. Plan and section views are shown on Dwg. 350-CI-008. Pond and liner details are shown on Dwg. 350-CI-009.

7.2 Authorized and Unauthorized Materials

The Plant Runoff Pond is designed and located to receive all stormwater from the processing plant areas. It is considered a non-storm water pond under APP regulations, as the runoff may come into contact with materials in process areas. The chemistry of solutions that will collect in this pond is difficult to predict, and it is likely to vary with time.

There will be no discharge of unauthorized materials such as solid waste, garbage, etc., to the Plant Runoff Pond.

7.3 Site Selection

The site was selected by M3 Engineering personnel during basic engineering efforts for the Project. The Plant Runoff Pond was located downgradient from the processing plant and the Raffinate Pond in order to intercept any contact water from the plant.

7.4 Site Characterization

The Plant Runoff Pond is located within a local drainage depression. Groundwater was not encountered in any of 16 geotechnical exploration boreholes drilled across the project area. Borehole depths ranged from 20 to 60 feet below ground surface (BGS). In addition, hydrogeologic characterization work has shown that groundwater is several hundred feet BGS. Therefore, groundwater is not expected to be encountered during construction excavation. Vegetation at the site consists of a sparse coverage of native grasses, occasional shrubs, and creosote.

The Plant Runoff Pond is underlain by several hundred feet of basin fill deposits consisting of moderately to strongly consolidated conglomerate and sandstone. Also included are lesser amounts of mudstone, siltstone, limestone, and gypsum. These deposits are generally light gray or tan. They commonly form high rounded hills and ridges in modern basins, and locally form prominent bluffs. Deposits of this unit are widely exposed in the dissected basins of southeastern and central Arizona. Bedrock was not encountered in nearby boring B-8. Soils are expected to be rippable where excavations for construction are necessary.

7.5 Surface Water Control

The Plant Runoff Pond will be an excavated pond with three elevated perimeter embankments. Surface flows will be directed into the western end of the pond. The Plant Runoff Pond can contain direct precipitation from the 100-year design storm event. Therefore, no spillway is proposed. The Plant Runoff Pond will be maintained such that two (2) feet of freeboard is maintained below the crest elevation.

The Plant Runoff Pond is not located within a FEMA 100-year floodplain but may be impacted by drainage flows. Pond embankment slopes subject to concentrated drainage flows will be protected to minimize erosion.

7.6 Geologic Hazards

There are no known geologic hazards in the vicinity of the Plant Runoff Pond.

7.7 Solution Characterization

The Plant Runoff Pond may receive overflow from the Raffinate Pond. Therefore, the solution characterization discussed in Section 2.7 also applies to the Plant Runoff Pond. Normally, the Plant Runoff Pond will contain stormwater at ambient temperature.

7.8 Capacity and Storage Design

The Plant Runoff Pond will be sized to contain the volume of the 100-year, 24-hour design storm entering the pond from precipitation within the contributing watershed.

The volume requirements for the Plant Runoff Pond are presented in Table 7.1.

Table 7.1 Plant Runoff Pond Volume Requirements

Design Storm Volume (ft^3)	Two (2) Feet Freeboard Volume (ft^3)	Total Volume Required (ft^3)	Total Volume Provided (ft^3)
272,900 (2.04 M Gal) 6.26 AF	92,460 (46,230 ft^2 x 2 feet) 2.12 AF	365,360 (8.39 AF)	382,330 (8.78 AF)

7.9 Site Preparation

The ground will be cleared of vegetation, grubbed, and stripped of topsoil and debris. Topsoil will be salvaged for use in reclamation. Native soils will be excavated and graded as necessary to the elevations specified in the detailed design. Areas that will receive controlled fill, structural fill, or support structures will be scarified, moisture conditioned, and compacted. Any unsuitable foundation material within the pond footprint will be excavated and replaced as necessary. The top six inches of prepared subgrade shall be compacted to a minimum of 95% of the maximum dry density as determined by Standard Proctor methods (ASTM D-698).

The Plant Runoff Pond lies on a naturally well-draining slope. However, the area will need to be excavated and graded. The side slopes of the pond will be graded to a 2.5:1 H:V slope in compliance with BADCT guidance.

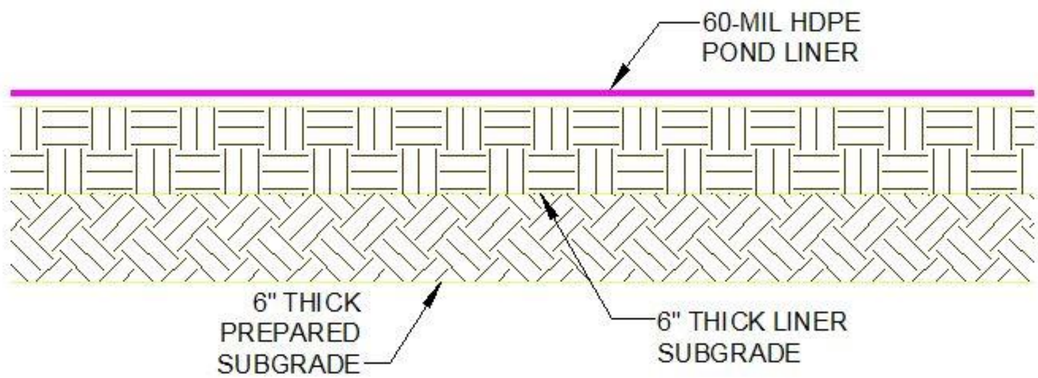
7.10 Liner System

The Plant Runoff Pond liner system will consist of the following (from bottom to top):

- A minimum six (6) inch thick layer of properly compacted native or natural material (prepared subgrade);
- A minimum six (6) inch thick layer of 3/8” minus native or natural material compacted to achieve a saturated hydraulic conductivity no greater than 10^{-6} cm/s (Liner Subgrade);
- A 60-mil HDPE geomembrane liner.

A cross section of the liner system for the Plant Runoff Pond is presented in Illustration 7.1.

Illustration 7.1 Plant Runoff Pond Liner System



All ground surfaces will be rolled and inspected prior to liner installation. A quality assurance/quality control (QA/QC) program will be implemented as part of the construction of this facility and will comply with the BADCT Manual for liner installation, operation, and maintenance.

Liner details are shown on Dwg. 350-CI-009 in the Figures at the end of the report.

The HDPE geomembrane liner materials are chemically compatible with the authorized solutions to be contained within the pond. The geomembrane liner shall be certified UV resistant for areas exposed to sunlight.

7.11 Perimeter Containment

The perimeter embankments of the Plant Runoff Pond will be elevated relative to adjacent ground on three sides. However, the west end will be at grade or slightly below grade in order to promote inflow of surface drainage. The geosynthetic liner system shall be secured in an engineered anchor trench located within the flat area adjacent to the top of the interior pond slopes. The anchor trench shall be continuous around the entire perimeter of the pond.

7.12 Leak Collection and Removal System

The Plant Runoff Pond is a single-lined non-stormwater pond. Therefore a Leak Collection and Removal System (LCRS) is not required.

7.13 Stability Design

The Plant Runoff Pond embankment height is less than 20 feet. Therefore the pond is not subject to the requirement to demonstrate stability.

7.14 Performance Inspections and Operational Monitoring

Routine facility inspections of the Plant Runoff Pond will be instituted at the time of construction and will proceed quarterly with additional inspections in the event of a process upset or a major storm/surface water flow event. All inspections will take the form of a visual assessment of integrity along with a physical appraisal of the pond capacity. Inspection records will remain onsite for a period prescribed in the APP. Additionally, a contingency plan has been developed and will be implemented in the event of an accidental discharge. The contingency plan concept is presented in Section 10 of the APP Application (Clear Creek, 2015).

7.15 Closure Strategy

The Plant Runoff Pond will be closed per prescriptive BADCT criteria for an excavated process solution pond. Any solid residue on the liner greater than 1/4 inch thick which can be readily removed, by sweeping or high pressure water sprays, will be removed and disposed of as appropriate.

The liner will be inspected for holes, tears, or defective seams that could have leaked. Where defects are found, the liner will be cut away in that location and the underlying soils will be visually inspected for signs of contamination. Sampling and analysis of the material may be necessary to determine the potential threat to groundwater quality and, if necessary, soil remediation will be conducted to prevent groundwater contamination. After the soil conditions have been approved by ADEQ, the bottom liner will be folded in toward the center of the pond and covered by backfilling the excavation. The Plant Runoff Pond area will be graded to drain surface run-off and minimize infiltration. The area will be reseeded as appropriate.

8 REFERENCES

Arizona Department of Environmental Quality, 2004. Arizona Mining Guidance Manual BADCT. Publication #TB 04-01.

Hydrometeorological Report No, 49 by NOAA and the U. S. Army Corps of Engineers (USDC, 1984)

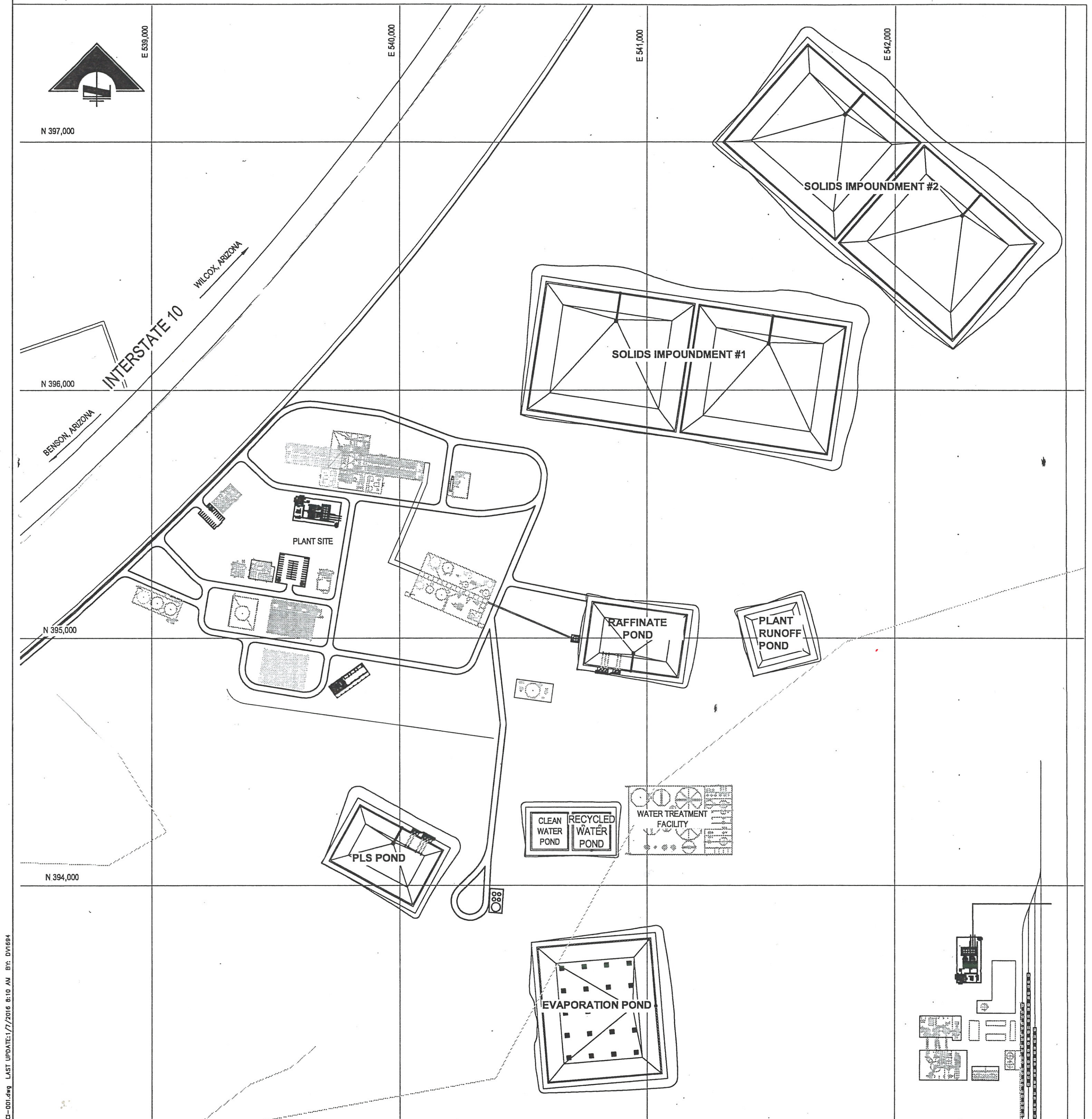
Terracon, 2015. Geotechnical Study

FIGURES

DESIGN DRAWINGS

GUNNISON COPPER PROJECT

PONDS AND IMPOUNDMENTS

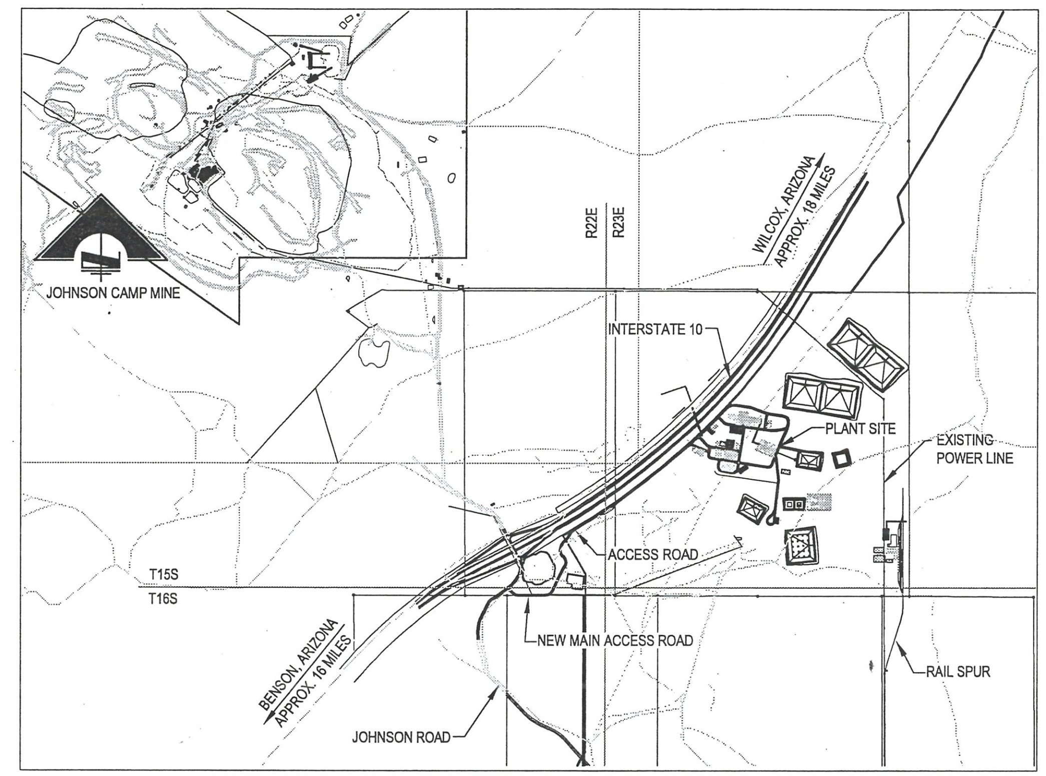


AREA MAP

SCALE: 1" = 250'

SHEET INDEX

SHEET NO.	SHEET TITLE
350-CI-001	PONDS COVER SHEET
350-CI-002	RAFFINATE POND PLAN AND SECTIONS
350-CI-003	PLS POND PLAN AND SECTIONS
350-CI-004	RECYCLED WATER POND PLAN AND SECTIONS
350-CI-005	EVAPORATION POND PLAN AND SECTIONS
350-CI-006	SOLIDS IMPOUNDMENT #1 PLAN AND SECTIONS
350-CI-007	SOLIDS IMPOUNDMENT #2 PLAN AND SECTIONS
350-CI-008	PLANT RUNOFF POND PLAN AND SECTIONS
350-CI-009	POND DETAILS



KEY MAP

SCALE: 1" = 1,500'

1500 750 0 1500 3000

SCALE IN FEET

Registered Professional Engineer (Civil)
CERTIFICATE NO. 40221
CRAIG A. HUNT
DATE SIGNED 1-11-16
ARIZONA U.S.A.

Craig A. Hunt

EXPIRES: 12-31-18

FIGURE K-1

250 125 0 250 500

SCALE IN FEET

DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
350-CI-002	RAFFINATE POND - PLAN AND SECTIONS	350-CI-007	SOLIDS IMPOUNDMENT #2 - PLAN & SECTIONS
350-CI-003	PLS POND - PLAN AND SECTIONS	350-CI-008	PLANT RUNOFF POND - PLAN & SECTIONS
350-CI-004	RECYCLED WATER POND - PLAN & SECTIONS	350-CI-009	POND DETAILS
350-CI-005	EVAPORATION POND - PLAN & SECTIONS		
350-CI-006	SOLIDS IMPOUNDMENT #1 - PLAN & SECTIONS		

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: AS NOTED		DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

m3 ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

GUNNISON COPPER PROJECT

SOLUTION PONDS
CIVIL
PONDS COVER SHEET

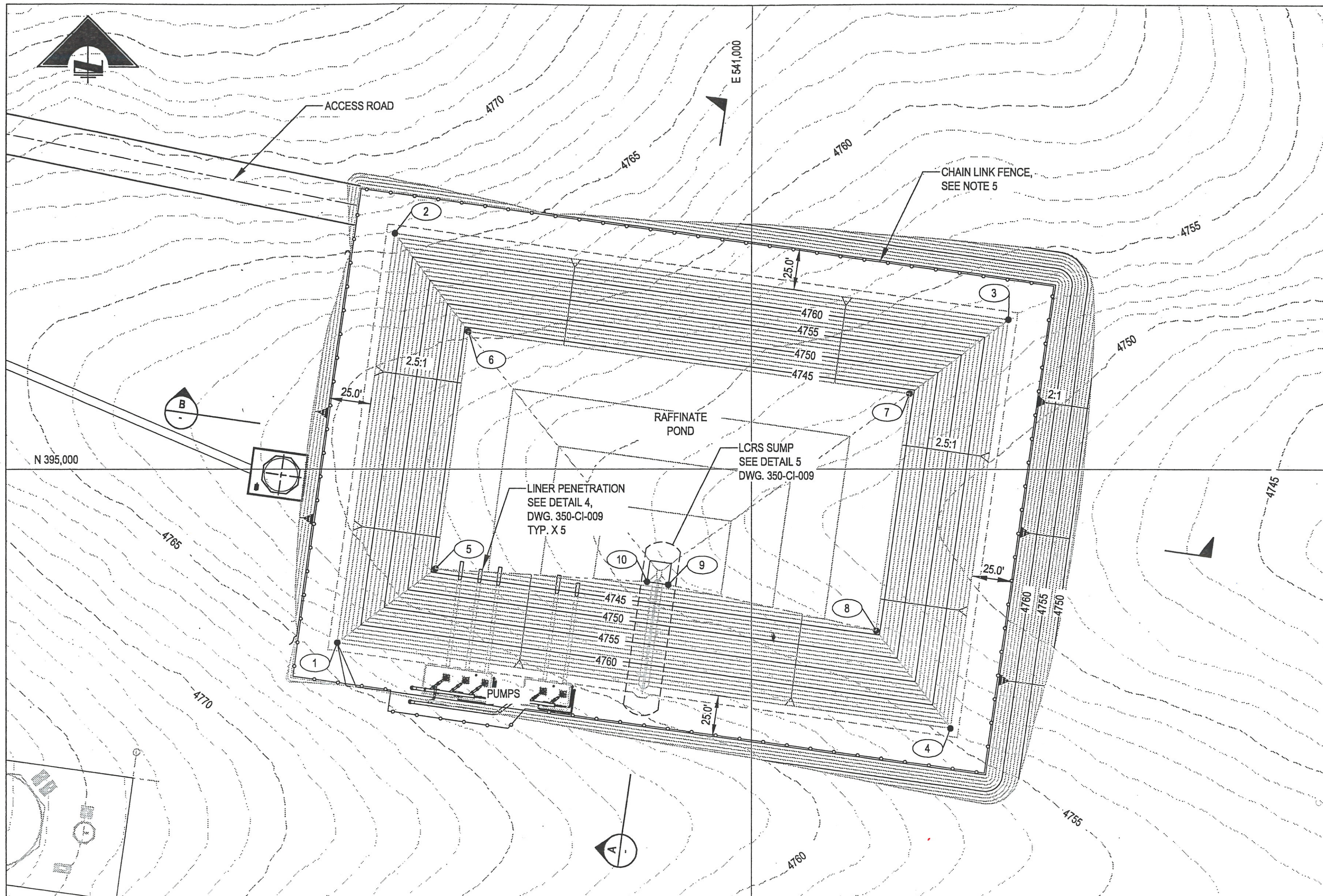
PROJECT NO. M3-PN 140129

DWG NO. 350-CI-001

REV NO. P3

DATE 07 JAN 16

File: P:\2014\140129\CIVIL (544)\544.2 Dwgs\350-CI-001.dwg LAST UPDATE:1/7/2016 8:10 AM BY: DV1684



PLAN

SCALE : 1" = 40'

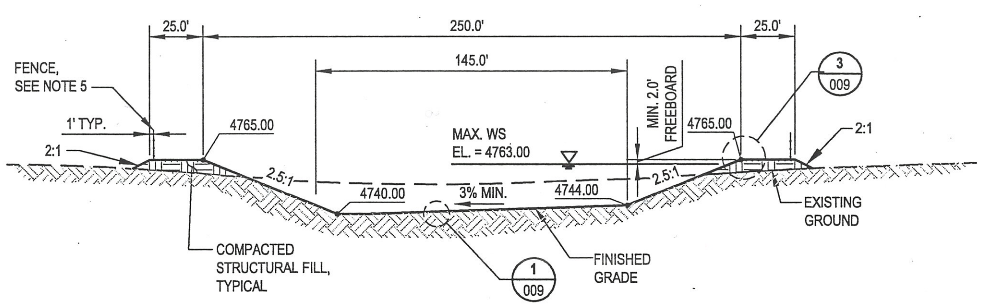
POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
1	394894.86	540749.21	4765.00
2	395142.44	540783.90	4765.00
3	395090.41	541155.27	4765.00
4	394842.82	541120.58	4765.00
5	394939.57	540808.48	4744.00
6	395083.16	540828.60	4744.00
7	395045.70	541095.99	4744.00
8	394902.11	541075.85	4744.00
9	394929.84	540950.00	4740.00
10	394931.64	540937.13	4740.00

NOTES:

1. EARTHWORK CALCULATION FOR POND IS BASED ON 2.0 HORIZONTAL TO 1.0 VERTICAL CUT & FILL SLOPES.
2. INTERIOR POND SLOPES ARE 2.5 HORIZONTAL TO 1.0 VERTICAL.
3. POND VOLUME OF 9,213,435 GALLONS (= 28.27 AC-FT) AT FREEBOARD ELEVATION (CREST ELEVATION LESS 2 FEET).
4. MAXIMUM POND VOLUME OF 10,569,853 GALLONS (= 32.43 AC-FT) AT CREST ELEVATION.
5. 6' HIGH CHAIN LINK FENCE PER DETAIL X, DWG 000-CI-XXX.

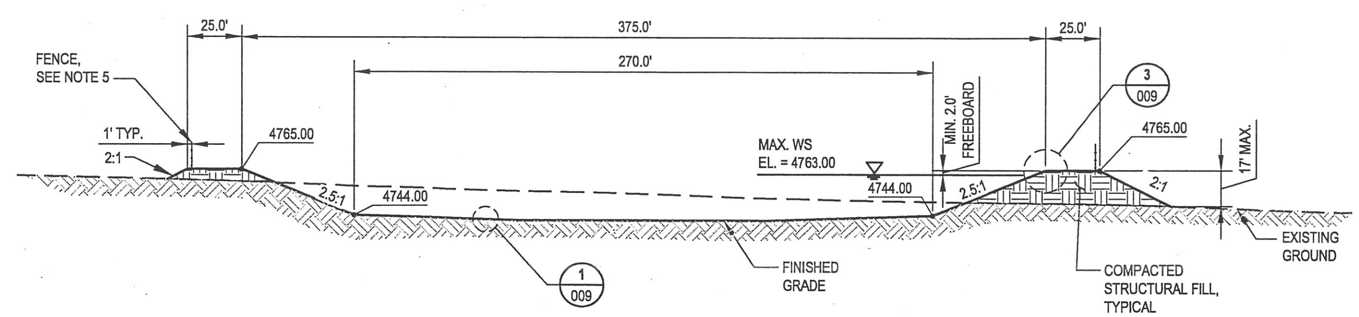
LEGEND	
▷—	CUT SLOPE
▶—	FILL SLOPE
607	CONTROL POINT

	VOLUME OF EARTHWORK	
	EXCAVATION	BACKFILL
RAFFINATE POND	24,536 cu. yds.	15,595 cu. yds.



SECTION A

SCALE : 1" = 40'



SECTION B

SCALE : 1" = 40'

Registered Professional Engineer (Civil)
CERTIFICATE NO. 40221
CRAIG A. HUNT
DATE SIGNED 1-11-16
ARIZONA U.S.A.

Craig A. Hunt
EXPIRES: 12-31-18

FIGURE K-2

40 20 0 40 80
SCALE IN FEET
CONTOUR INTERVAL = 1 FT.
DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

GUNNISON COPPER PROJECT

SOLUTION PONDS
CIVIL
RAFFINATE POND
PLAN AND SECTIONS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
350-CI-001	COVER SHEET		
350-CI-009	POND DETAILS		

REVISIONS						REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	AS NOTED	DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

m3 ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

PROJECT NO. M3-PN 140129
DWG NO. 350-CI-002
REV NO. P3
DATE 07 JAN 16

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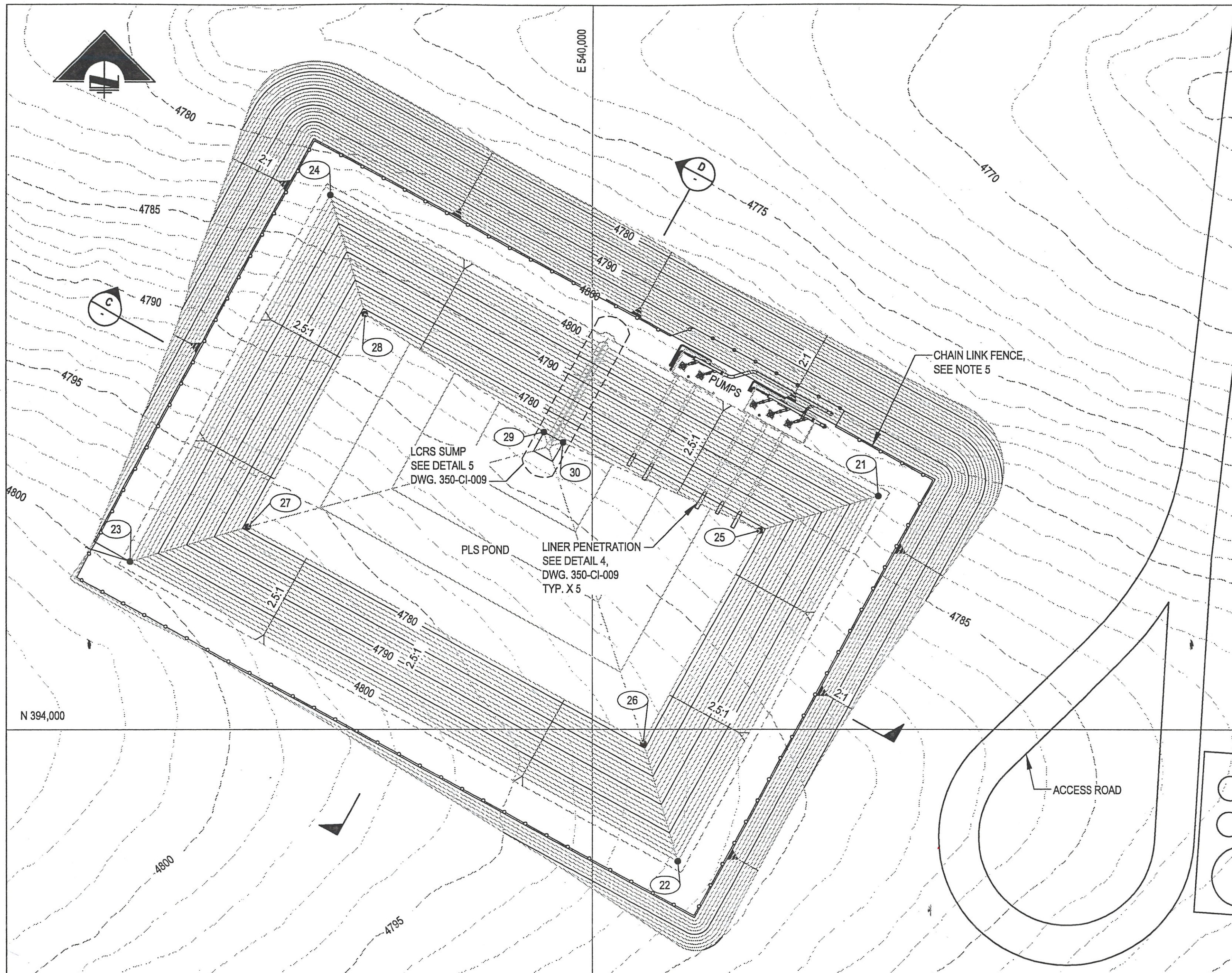
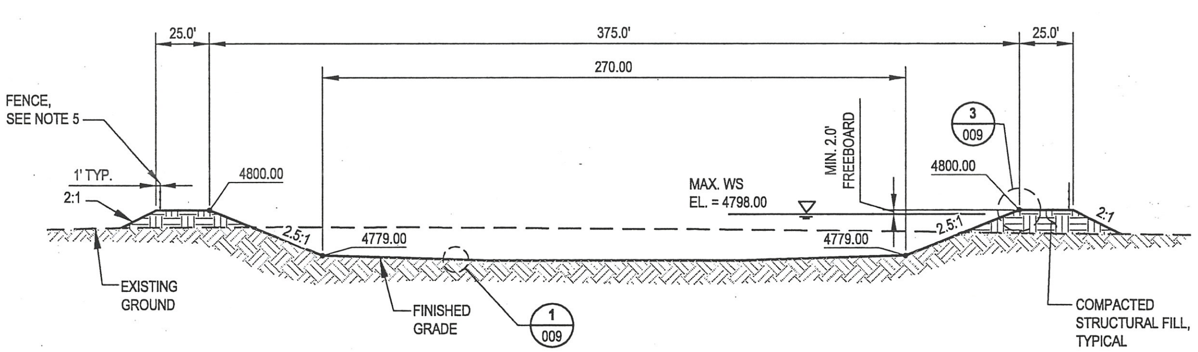


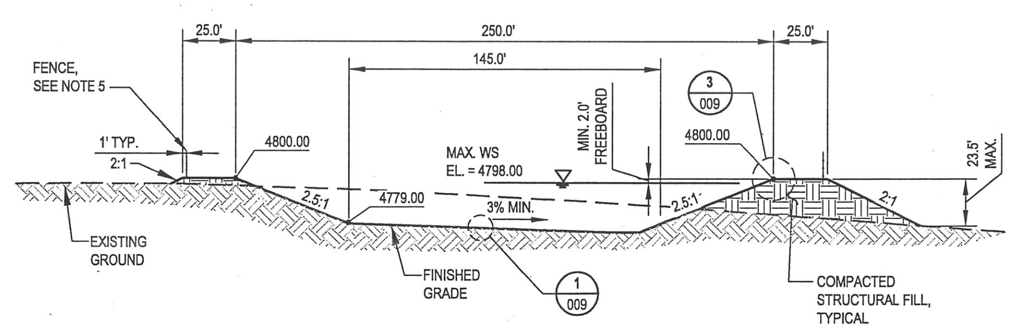
PLAN

SCALE : 1" = 40'



SECTION C

SCALE : 1" = 40'



SECTION D

SCALE : 1" = 40'

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
21	394139.99	540171.33	4800.00
22	393920.71	540051.26	4800.00
23	394100.81	539722.34	4800.00
24	394320.09	539842.41	4800.00
25	394119.16	540100.06	4779.00
26	393991.97	540030.42	4779.00
27	394121.65	539793.60	4779.00
28	394248.83	539863.24	4779.00
29	394178.34	539971.15	4775.00
30	394172.10	539982.55	4775.00

NOTES:

1. EARTHWORK CALCULATION FOR POND IS BASED ON 2.0 HORIZONTAL TO 1.0 VERTICAL CUT & FILL SLOPES.
2. INTERIOR POND SLOPES ARE 2.5 HORIZONTAL TO 1.0 VERTICAL.
3. POND VOLUME OF 9,213,435 GALLONS (=28.27 AC-FT) AT FREEBOARD ELEVATION (CREST ELEVATION LESS 2 FEET).
4. MAXIMUM POND VOLUME OF 10,569,853 GALLONS (= 32.43 AC-FT) AT CREST ELEVATION.
5. 6' HIGH CHAIN LINK FENCE PER DETAIL X, DWG 000-CI-XXX.

LEGEND	
▷—	CUT SLOPE
▶—	FILL SLOPE
(607)	CONTROL POINT

	VOLUME OF EARTHWORK	
	EXCAVATION	BACKFILL
PLS POND	26,672 cu. yds.	30,450 cu. yds.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 40221
CRAIG A. HUNT
DATE SIGNED 1-11-16
ARIZONA U.S.A.
Craig A. Hunt
EXPIRES: 12-31-18

FIGURE K-3

40 20 0 40 80
SCALE IN FEET
CONTOUR INTERVAL = 1'
DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
350-CI-001	COVER SHEET		
350-CI-009	POND DETAILS		

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	1"=40'	DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

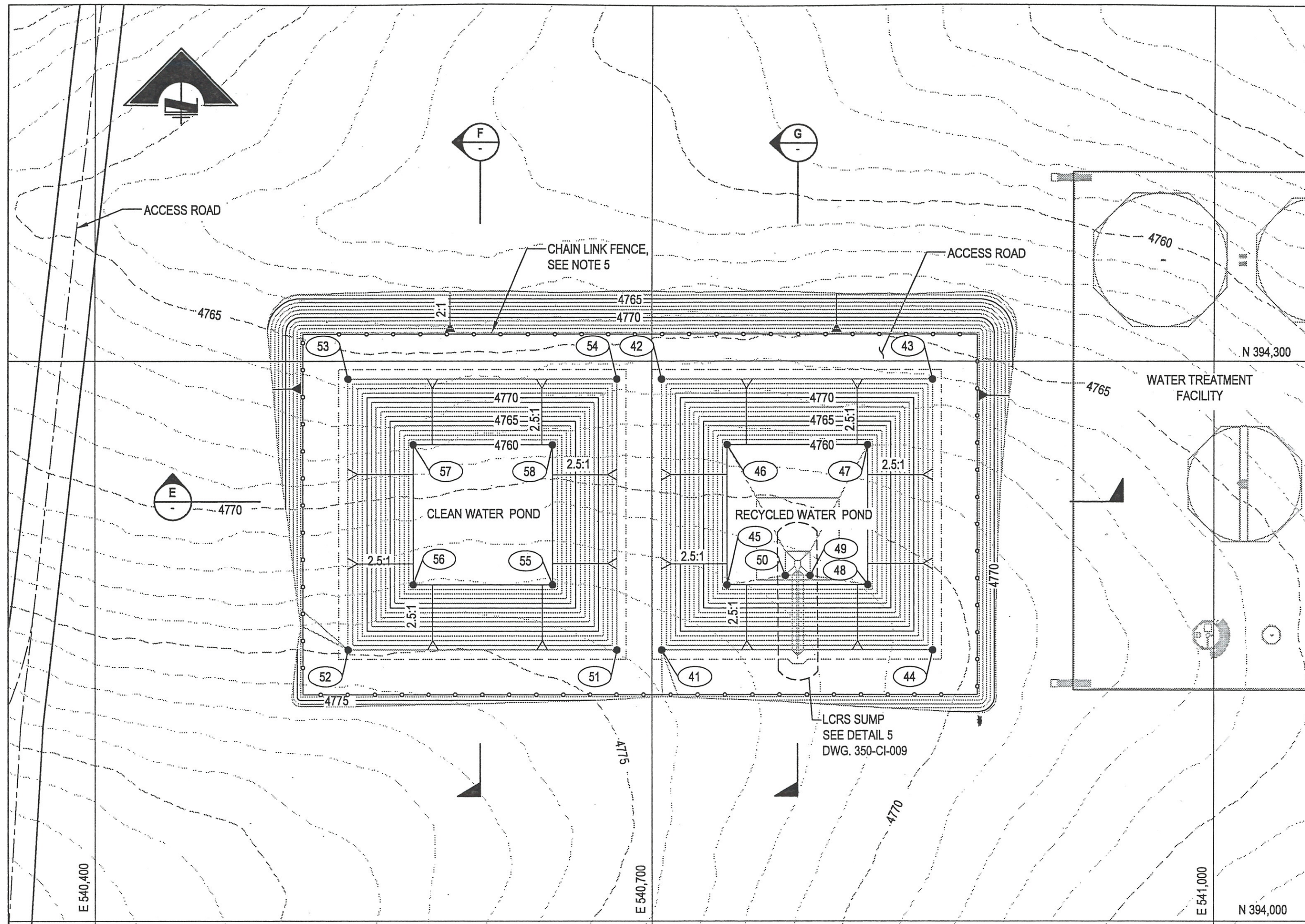
m3 ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

GUNNISON COPPER PROJECT

SOLUTION PONDS
CIVIL
PLS POND
PLAN AND SECTIONS

PROJECT NO. M3-PN 140129
DWG NO. 350-CI-003
REV NO. P3
DATE 07 JAN 16

File: P:\2014\140129\CIVIL (544)\544.2 Dwgs\350-CI-003.dwg LAST UPDATE:12/22/2015 3:23 PM BY: CH245



PLAN

SCALE : 1" = 40'

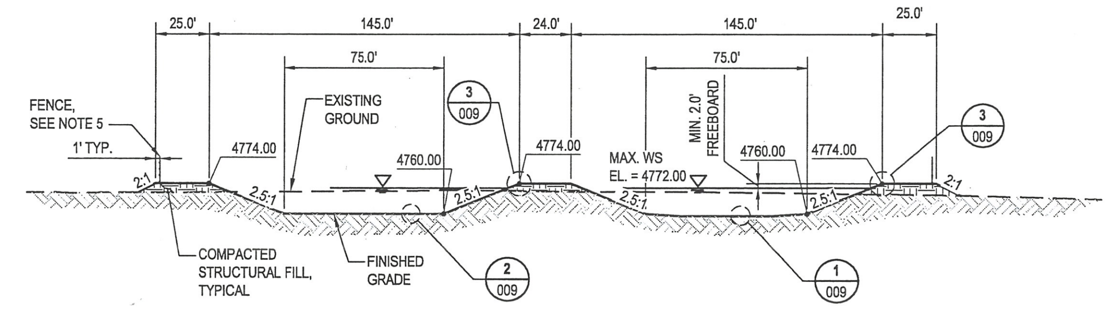
POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
41	394145.30	540705.16	4774.00
42	394290.30	540705.16	4774.00
43	394290.30	540850.16	4774.00
44	394145.30	540850.16	4774.00
45	394180.30	540740.16	4760.00
46	394255.30	540740.16	4760.00
47	394255.30	540815.16	4760.00
48	394180.30	540815.16	4760.00
49	394185.30	540784.16	4758.00
50	394185.30	540771.16	4758.00
51	394145.30	540681.16	4774.00
52	394145.30	540536.16	4774.00
53	394290.30	540536.16	4774.00
54	394290.30	540681.16	4774.00
55	394180.30	540646.16	4760.00
56	394180.30	540571.16	4760.00
57	394255.30	540571.16	4760.00
58	394255.30	540646.16	4760.00

NOTES:

1. EARTHWORK CALCULATION FOR POND IS BASED ON 2.0 HORIZONTAL TO 1.0 VERTICAL CUT & FILL SLOPES.
2. INTERIOR POND SLOPES ARE 2.5 HORIZONTAL TO 1.0 VERTICAL.
3. RECYCLED WATER POND VOLUME OF 1,050,332 GALLONS (= 3.22 AC-FT) AT FREEBOARD ELEVATION (CREST ELEVATION LESS 2 FEET).
4. MAXIMUM RECYCLED WATER POND VOLUME OF 1,343,714 GALLONS (= 4.12 AC-FT) AT CREST ELEVATION.
5. 6' HIGH CHAIN LINK FENCE PER DETAIL X, DWG 000-CI-XXX.

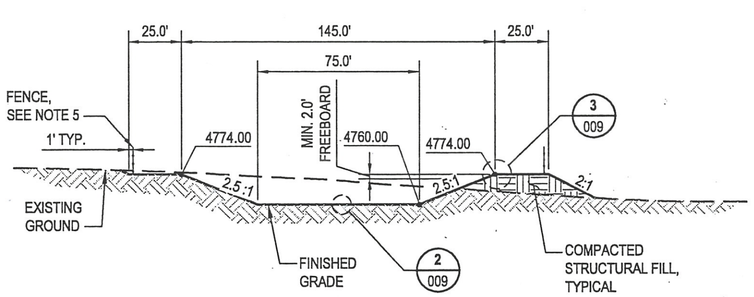
LEGEND	
▷—	CUT SLOPE
▶—	FILL SLOPE
(607)	CONTROL POINT

	VOLUME OF EARTHWORK	
	EXCAVATION	BACKFILL
CLEAN AND RECYCLED WATER PONDS	8,695 cu. yds.	7,958 cu. yds.



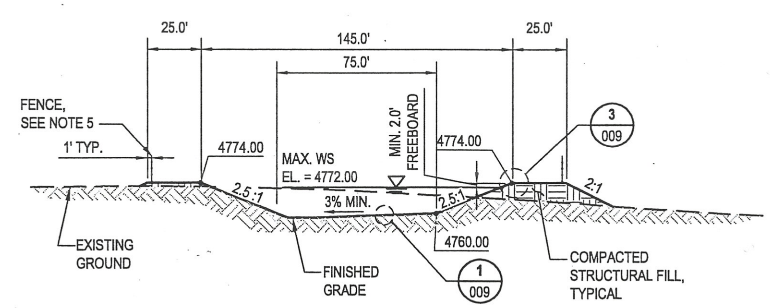
SECTION E

SCALE : 1" = 40'



SECTION F

SCALE : 1" = 40'



SECTION G

SCALE : 1" = 40'

FIGURE K-4

40 20 0 40 80
SCALE IN FEET
CONTOUR INTERVAL = 1 FT.
DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

GUNNISON COPPER PROJECT

SOLUTION PONDS
CIVIL
RECYCLED WATER POND
PLAN AND SECTIONS

REFERENCES	
DWG. NO.	TITLE
350-CI-001	COVER SHEET
350-CI-009	POND DETAILS

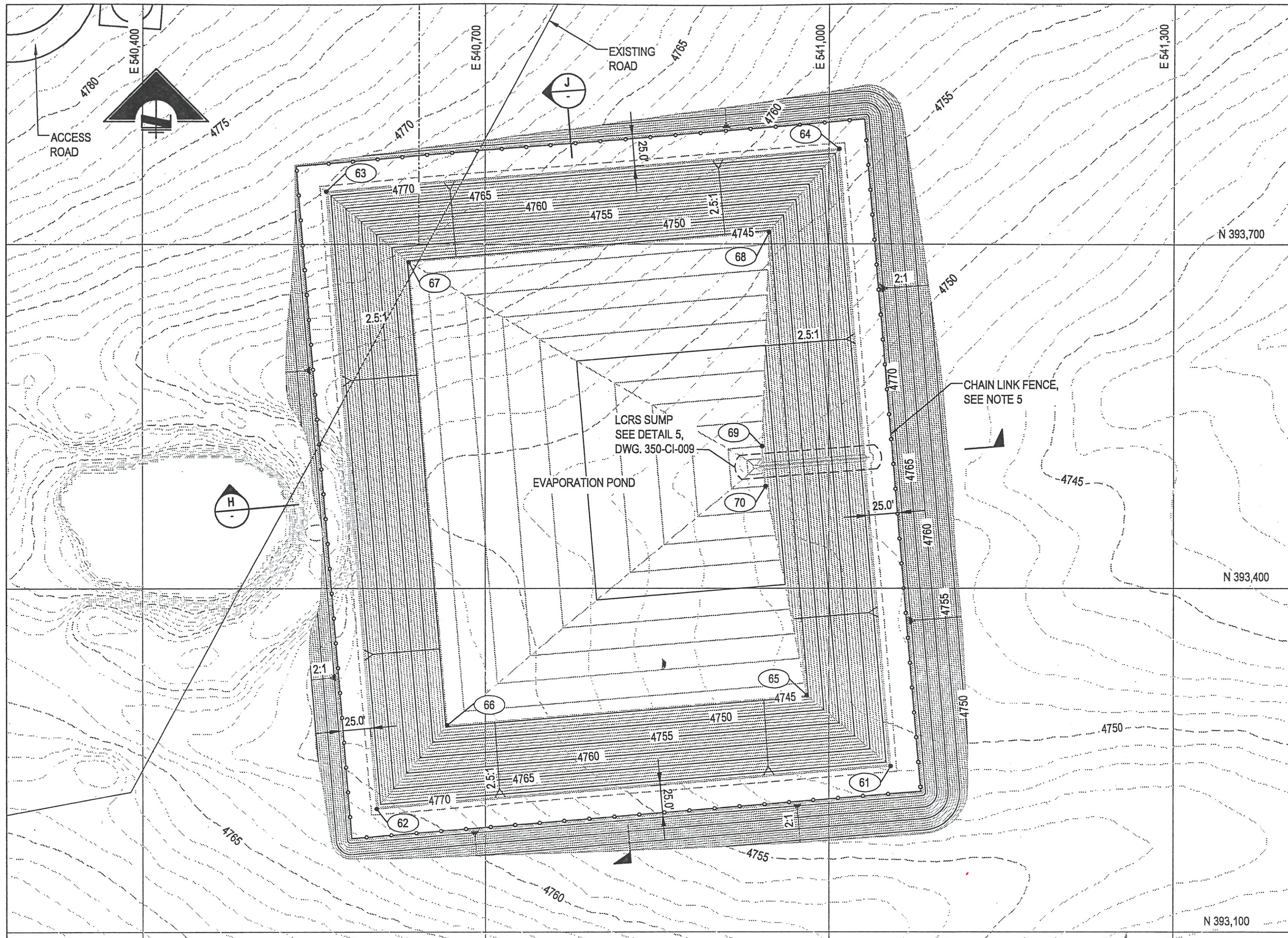
REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	1"=40'	DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

m3 ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

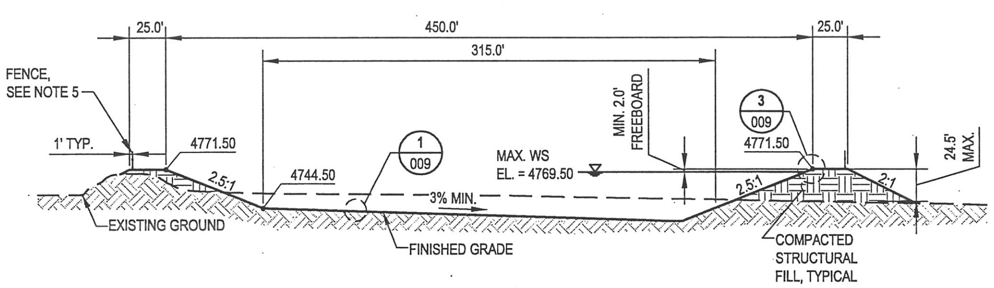
PROJECT NO. M3-PN 140129
DWG NO. 350-CI-004
REV NO. P3
DATE 07 JAN 16

File: P:\2014\140129\CIVIL (544)\544.2 Dwgs\350-CI-004.dwg LAST UPDATE:12/22/2015 4:37 PM BY: CH245



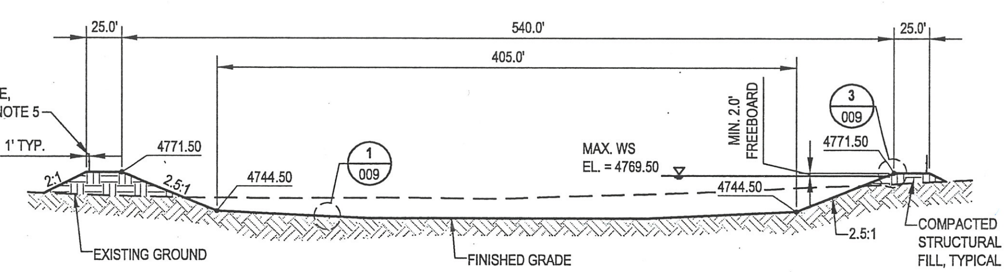
PLAN

SCALE : 1" = 60'



SECTION H

SCALE : 1" = 60'



SECTION J

SCALE : 1" = 60'

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
61	393244.83	541053.43	4771.50
62	393207.71	540604.96	4771.50
63	393745.87	540560.42	4771.50
64	393782.99	541008.89	4771.50
65	393306.53	540980.59	4744.50
66	393280.55	540666.66	4744.50
67	393684.17	540633.26	4744.50
68	393710.15	540947.18	4744.50
69	393523.92	540941.28	4736.00
70	393489.26	540944.14	4736.00

NOTES:

1. EARTHWORK CALCULATION FOR POND IS BASED ON 2.0 HORIZONTAL TO 1.0 VERTICAL CUT & FILL SLOPES.
2. INTERIOR POND SLOPES ARE 2.5 HORIZONTAL TO 1.0 VERTICAL.
3. POND VOLUME OF 36,221,925 GALLONS (=111.15 AC-FT) AT FREEBOARD ELEVATION (CREST ELEVATION LESS 2 FEET).
4. MAXIMUM POND VOLUME OF 39,784,123 GALLONS (=122.08 AC-FT) AT CREST ELEVATION.
5. 6' HIGH CHAIN LINK FENCE PER DETAIL X, DWG 000-CI-XXX.

LEGEND	
▷—	CUT SLOPE
▶—	FILL SLOPE
607	CONTROL POINT

	VOLUME OF EARTHWORK	
	EXCAVATION	BACKFILL
EVAPORATION POND	74,270 cu. yds.	64,000 cu. yds.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 40221
CRAIG A. HUNT
DATE SIGNED 1-11-16
ARIZONA U.S.A.
Craig A. Hunt
EXPIRES: 12-31-18

FIGURE K-5

60 30 0 60 120
SCALE IN FEET
CONTOUR INTERVAL = 1 FT
DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

REFERENCES	
DWG. NO.	TITLE
350-CI-001	COVER SHEET
350-CI-009	POND DETAILS

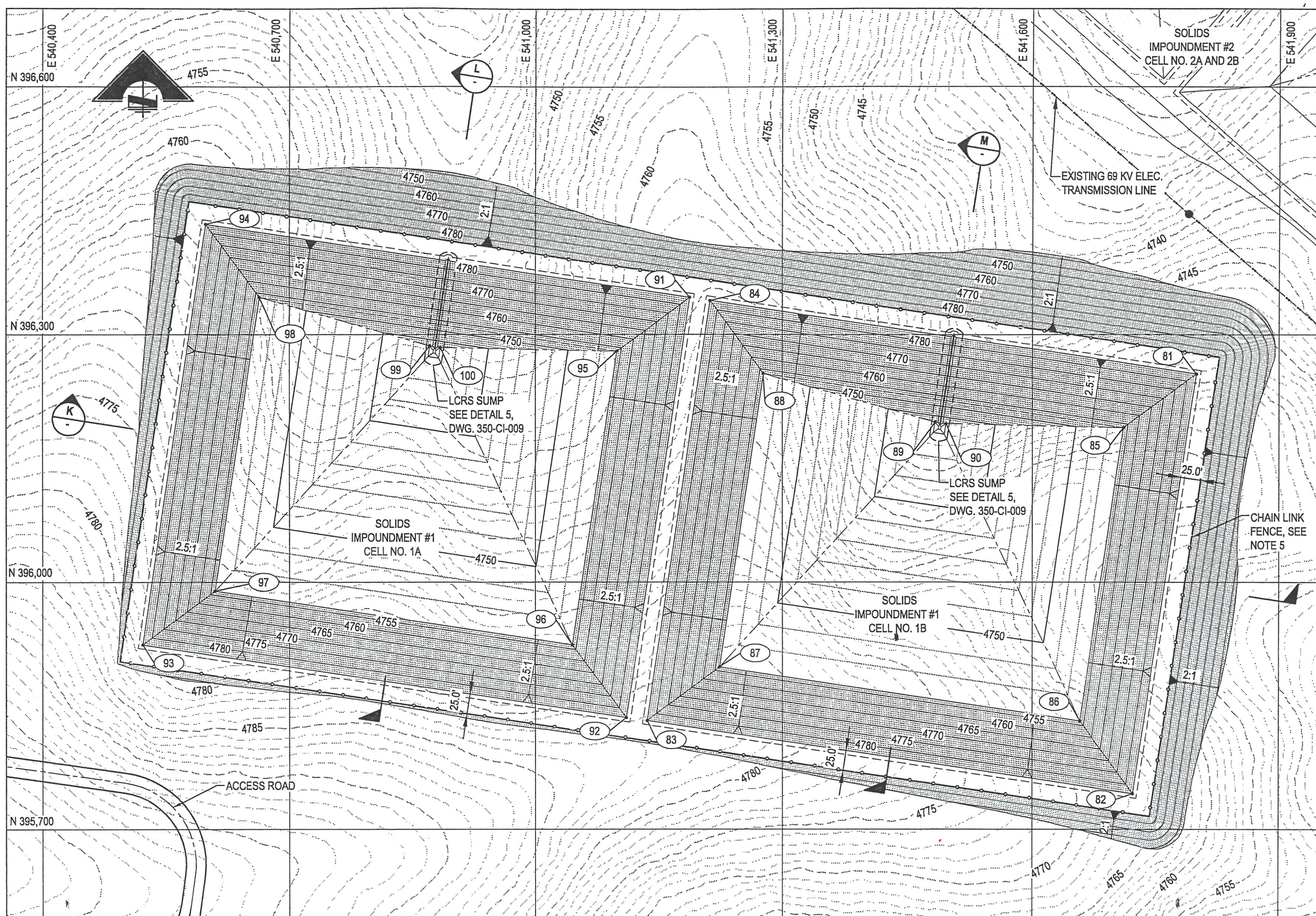
SCALE:	AS NOTED	DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

m3 ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

GUNNISON COPPER PROJECT

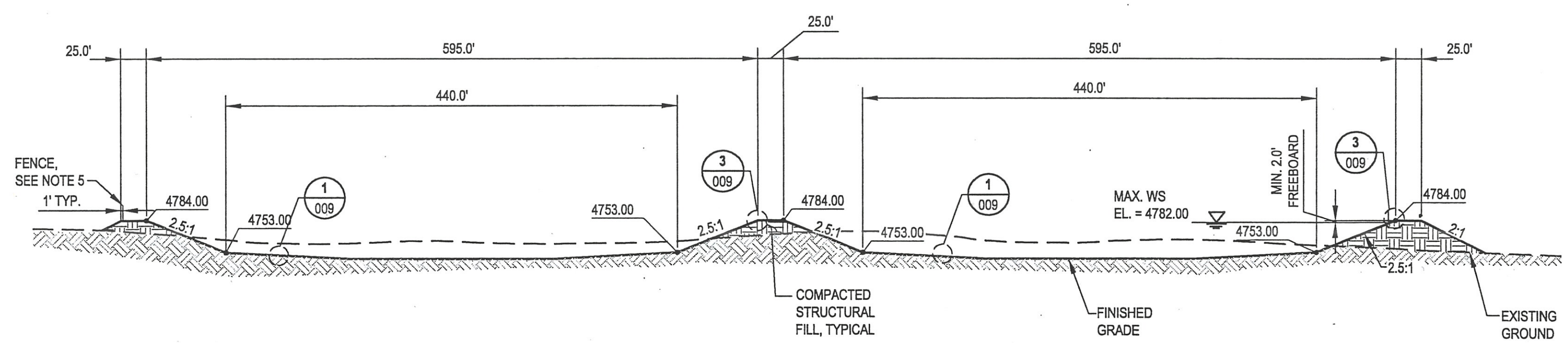
SOLUTION PONDS
CIVIL
EVAPORATION POND
PLAN AND SECTIONS

PROJECT NO. M3-PN 140129
DWG NO. 350-CI-005
REV NO. P3
DATE 07 JAN 16



PLAN

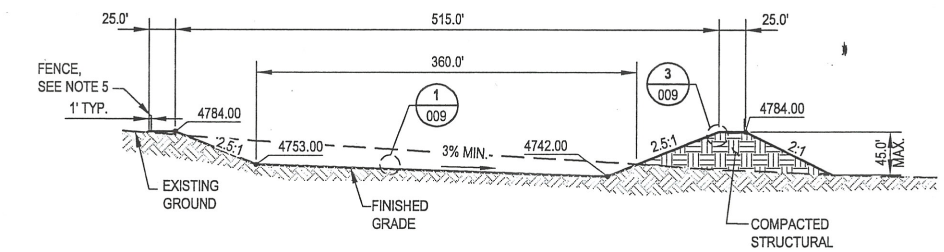
SCALE : 1" = 80'



SECTION K

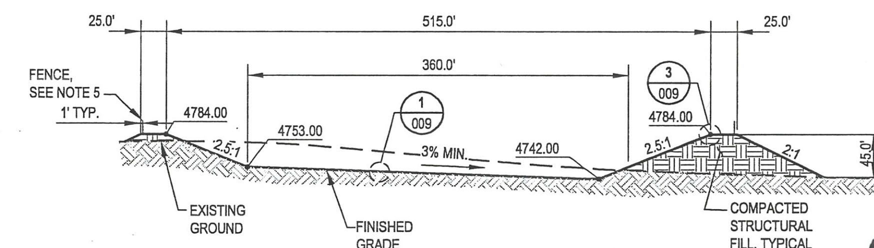
SCALE : 1" = 80'

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
81	396252.56	541800.06	4784.00
82	395743.29	541723.44	4784.00
83	395831.82	541135.06	4784.00
84	396341.08	541211.68	4784.00
85	396187.43	541711.89	4753.00
86	395831.44	541658.33	4753.00
87	395896.90	541223.23	4753.00
88	396252.89	541276.79	4753.00
89	396193.93	541483.82	4742.00
90	396192.00	541496.68	4742.00
91	396344.80	541186.96	4784.00
92	395835.54	541110.34	4784.00
93	395924.06	540521.96	4784.00
94	396433.33	540598.58	4784.00
95	396279.67	541098.79	4753.00
96	395923.68	541045.23	4753.00
97	395989.14	540610.13	4753.00
98	396345.13	540663.69	4753.00
99	396286.18	540870.72	4742.00
100	396284.24	540883.58	4742.00



SECTION L

SCALE : 1" = 80'



SECTION M

SCALE : 1" = 80'

NOTES:

1. EARTHWORK CALCULATION FOR POND IS BASED ON 2.0 HORIZONTAL TO 1.0 VERTICAL CUT & FILL SLOPES.
2. INTERIOR POND SLOPES ARE 2.5 HORIZONTAL TO 1.0 VERTICAL.
3. POND VOLUME OF 105,920,771 GALLONS (=325.04 AC-FT) AT FREEBOARD ELEVATION (CREST ELEVATION LESS 2 FEET).
4. MAXIMUM POND VOLUME OF 114,925,142 GALLONS (= 352.67 AC-FT) AT CREST ELEVATION.
5. 6' HIGH CHAIN LINK FENCE PER DETAIL X, DWG 000-CI-XXX.

LEGEND	
▷—	CUT SLOPE
▶—	FILL SLOPE
607	CONTROL POINT

	VOLUME OF EARTHWORK	
SOLIDS IMPOUNDMENT #1	EXCAVATION	BACKFILL
CELL NO. 1A	98,658 cu. yds.	87,118 cu. yds.
CELL NO. 1B	119,412 cu. yds.	122,694 cu. yds.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 40221
CRAIG A. HUNT
DATE SIGNED 1-11-16
ARIZONA U.S.A.

Craig A. Hunt
EXPIRES: 12-31-18

FIGURE K-6

80 40 0 80 160
SCALE IN FEET
CONTOUR INTERVAL = 1 FT
DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

REFERENCES	
DWG. NO.	TITLE
350-CI-001	COVER SHEET
350-CI-009	POND DETAILS

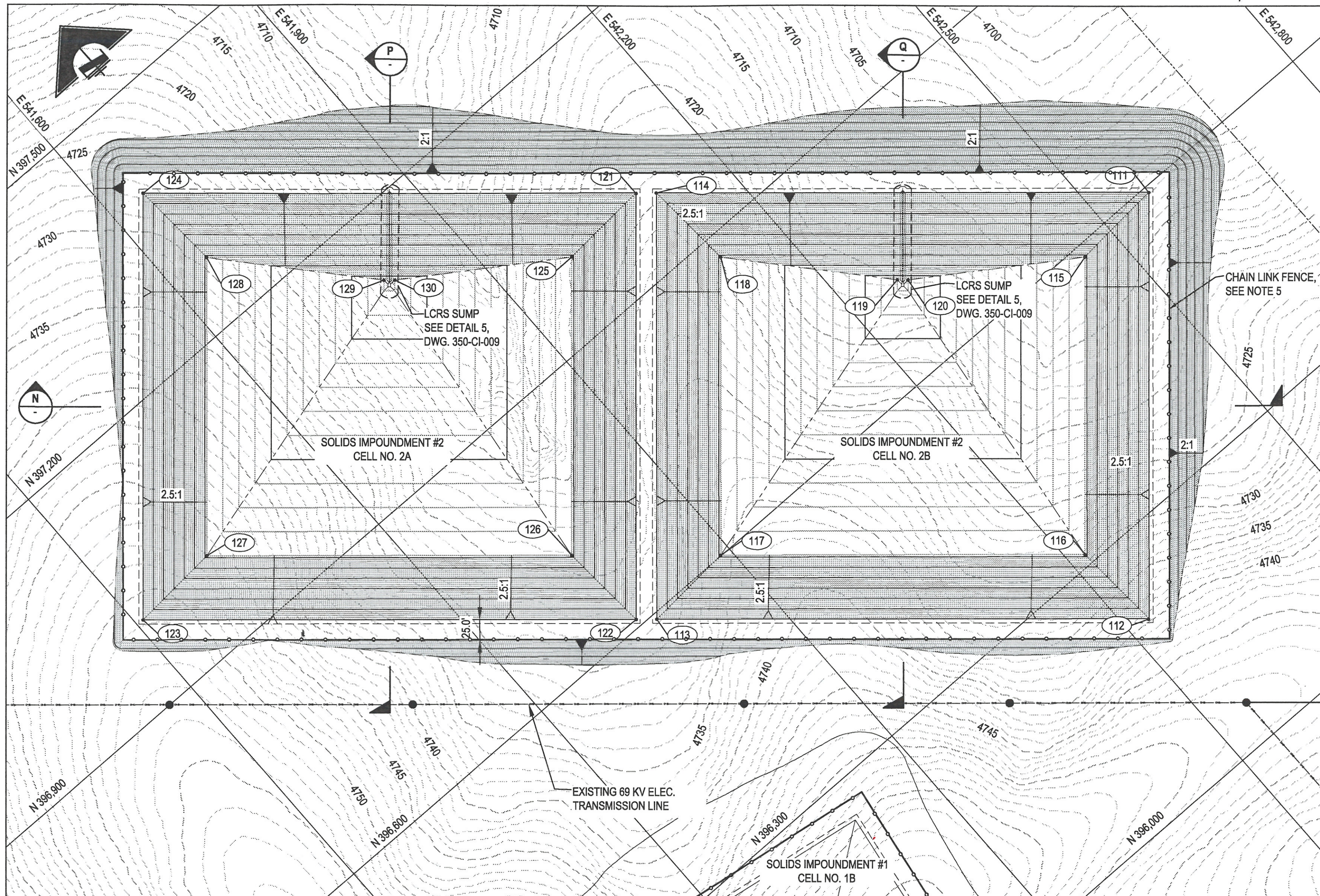
SCALE:	1"=80'	DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

m3 ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

GUNNISON COPPER PROJECT

SOLUTION PONDS
CIVIL
SOLIDS IMPOUNDMENT #1
PLAN AND SECTIONS

PROJECT NO. M3-PN 140129
DWG NO. 350-CI-006
REV NO. P3
DATE 07 JAN 16



PLAN

SCALE : 1" = 80'

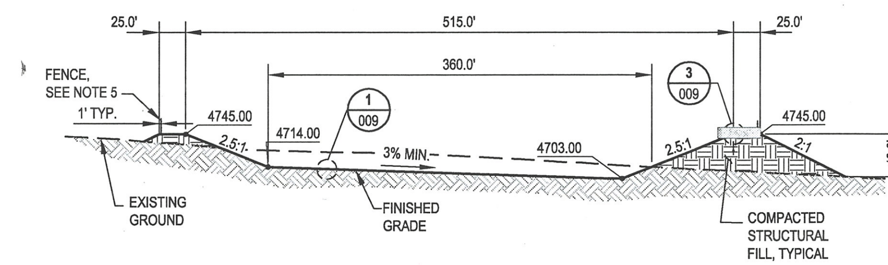
POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
111	396592.83	542564.99	4745.00
112	396203.54	542227.82	4745.00
113	396593.09	541778.06	4745.00
114	396982.37	542115.23	4745.00
115	396584.98	542455.67	4714.00
116	396312.86	542219.97	4714.00
117	396600.93	541887.38	4714.00
118	396873.05	542123.07	4714.00
119	396712.48	542266.45	4703.00
120	396703.97	542276.28	4703.00
121	396998.74	542096.33	4745.00
122	396609.45	541759.16	4745.00
123	396999.00	541309.41	4745.00
124	397388.28	541646.58	4745.00
125	396990.90	541987.01	4714.00
126	396718.77	541751.32	4714.00
127	397006.84	541418.73	4714.00
128	397278.96	541654.42	4714.00
129	397118.39	541797.80	4703.00
130	397109.89	541807.63	4703.00

NOTES:

1. EARTHWORK CALCULATION FOR POND IS BASED ON 2.0 HORIZONTAL TO 1.0 VERTICAL CUT & FILL SLOPES.
2. INTERIOR POND SLOPES ARE 2.5 HORIZONTAL TO 1.0 VERTICAL.
3. POND VOLUME OF 105,920,771 GALLONS (=325.04 AC-FT) AT FREEBOARD ELEVATION (CREST ELEVATION LESS 2 FEET).
4. MAXIMUM POND VOLUME OF 114,925,142 GALLONS (= 352.67 AC-FT) AT CREST ELEVATION.
5. 6' HIGH CHAIN LINK FENCE PER DETAIL X, DWG 000-CI-XXX.

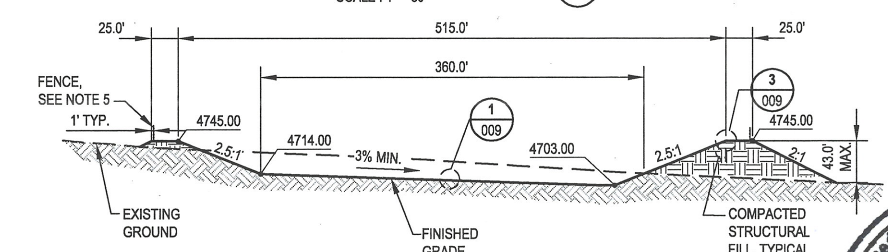
LEGEND
- CUT SLOPE
- FILL SLOPE
- 807 CONTROL POINT

	VOLUME OF EARTHWORK	
SOLIDS IMPOUNDMENT #2	EXCAVATION	BACKFILL
CELL NO. 2A	114,763 cu. yds.	89,106 cu. yds.
CELL NO. 2B	96,271 cu. yds.	127,565 cu. yds.



SECTION P

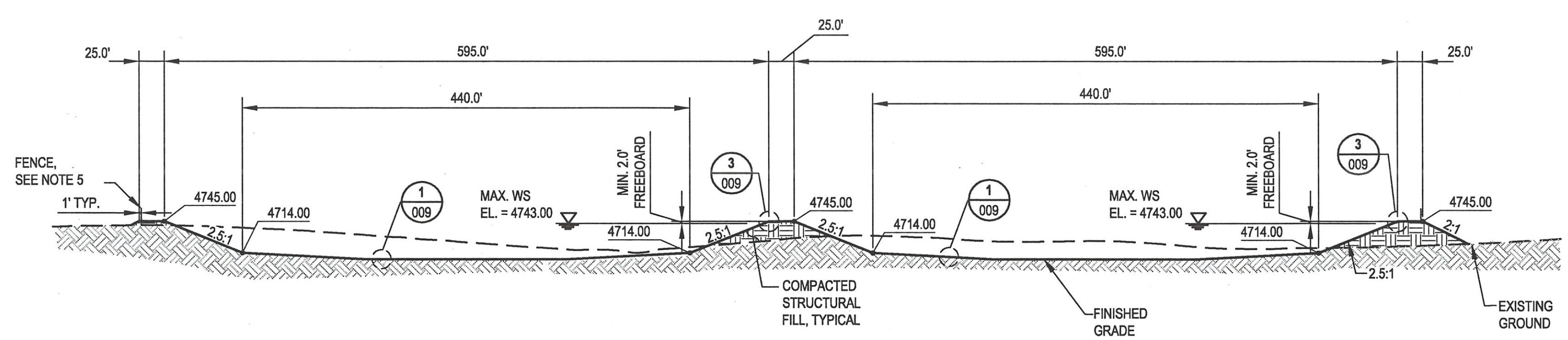
SCALE : 1" = 80'



SECTION Q

SCALE : 1" = 80'

Registered Professional Engineer (Civil)
CERTIFICATE NO. 40221
CRAIG A. HUNT
DATE SIGNED 1-11-16
ARIZONA U.S.A.
Craig A. Hunt
EXPIRES: 12-31-18



SECTION N

SCALE : 1" = 80'

FIGURE K-7

SCALE IN FEET
CONTOUR INTERVAL = 1 FT
DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

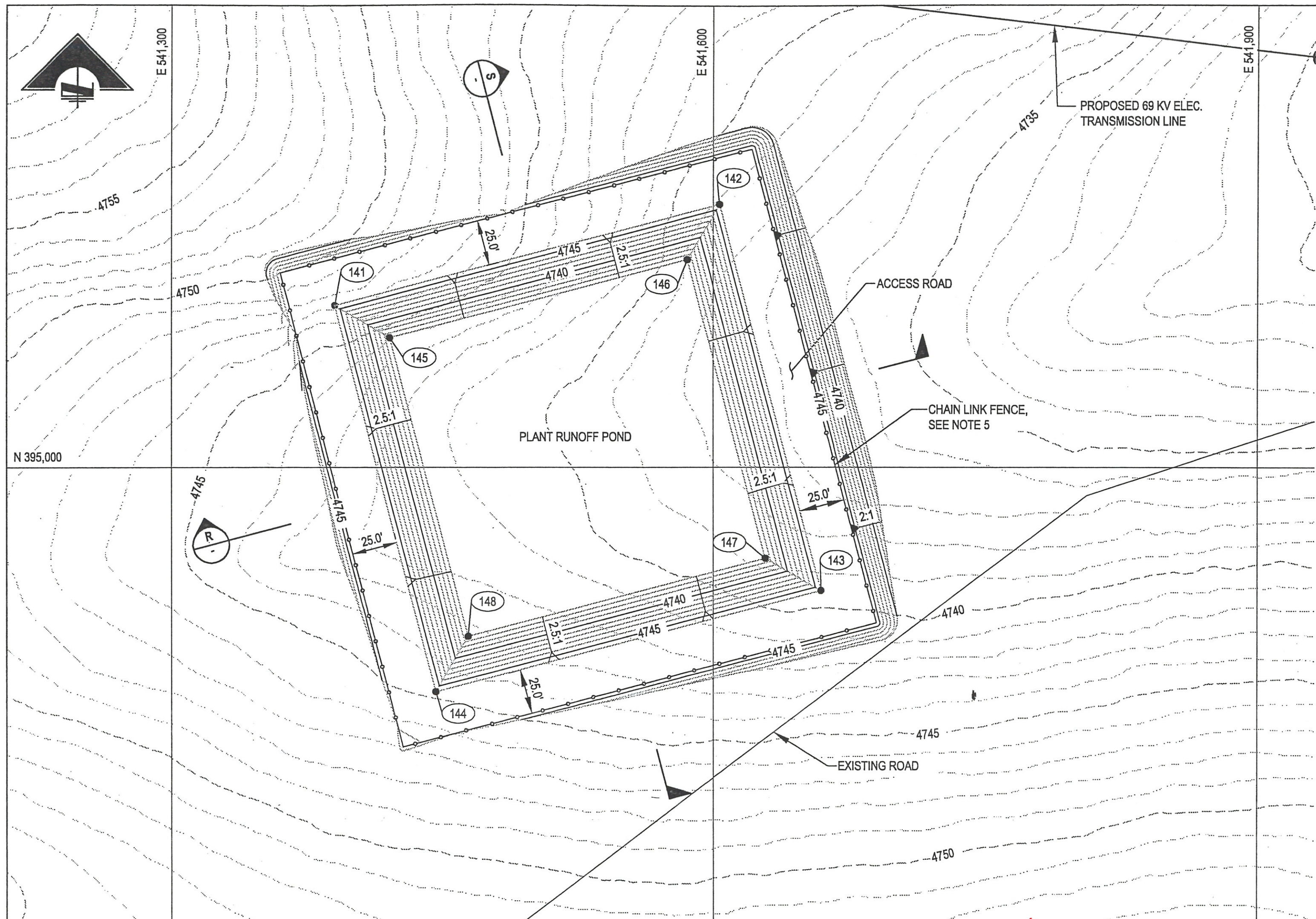
GUNNISON COPPER PROJECT

SOLUTION PONDS
CIVIL
SOLIDS IMPOUNDMENT #2
PLAN AND SECTIONS

REFERENCES	
DWG. NO.	TITLE
350-CI-001	COVER SHEET
350-CI-009	POND DETAILS

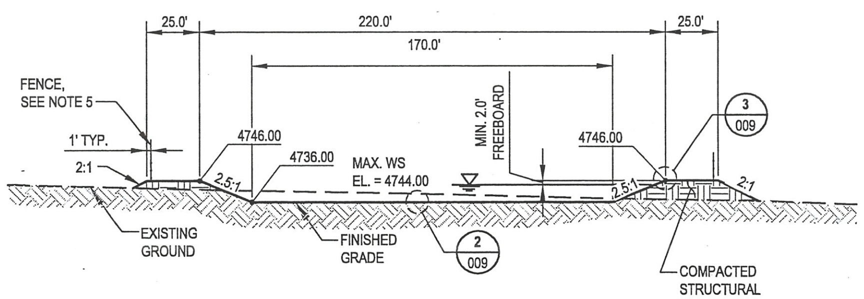
SCALE:	1"=80'	DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

PROJECT NO. M3-PN 140129
DWG NO. 350-CI-007
REV NO. P3
DATE 07 JAN 16



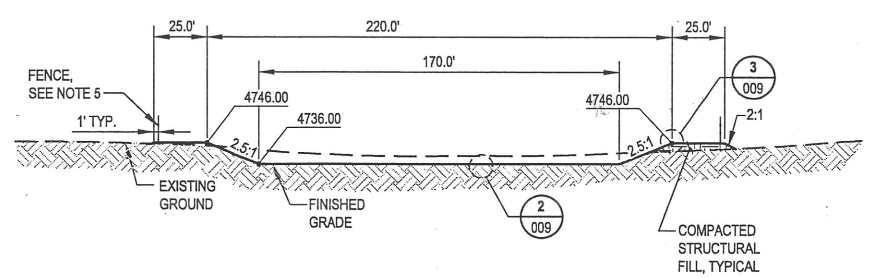
PLAN

SCALE : 1" = 40'



SECTION (R)

SCALE : 1" = 40'



SECTION (S)

SCALE : 1" = 40'

POINT TABLE			
POINT #	NORTHING	EASTING	ELEVATION
141	395089.08	541390.55	4746.00
142	395144.84	541603.37	4746.00
143	394932.02	541659.13	4746.00
144	394876.26	541446.31	4746.00
145	395071.23	541421.07	4736.00
146	395114.32	541585.52	4736.00
147	394949.87	541628.61	4736.00
148	394906.78	541464.16	4736.00

NOTES:

1. EARTHWORK CALCULATION FOR POND IS BASED ON 2.0 HORIZONTAL TO 1.0 VERTICAL CUT & FILL SLOPES.
2. INTERIOR POND SLOPES ARE 2.5 HORIZONTAL TO 1.0 VERTICAL.
3. POND VOLUME OF 2,168,495 GALLONS (=6.65 AC-FT) AT FREEBOARD ELEVATION (CREST ELEVATION LESS 2 FEET).
4. MAXIMUM POND VOLUME OF 2,860,233 GALLONS (= 8.78 AC-FT) AT CREST ELEVATION.
5. 6' HIGH CHAIN LINK FENCE PER DETAIL X, DWG 000-CI-XXX.

LEGEND	
▷—	CUT SLOPE
▶—	FILL SLOPE
(607)	CONTROL POINT

	VOLUME OF EARTHWORK	
	EXCAVATION	BACKFILL
PLANT RUNOFF POND	5,839 cu. yds.	5,493 cu. yds.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 40221
CRAIG A. HUNT
DATE SIGNED 1-11-16
ARIZONA U.S.A.
Craig A. Hunt
EXPIRES: 12-31-18

FIGURE K-8

40 20 0 40 80
SCALE IN FEET
CONTOUR INTERVAL = 1 FT
DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

GUNNISON COPPER PROJECT

SOLUTION PONDS
CIVIL
PLANT RUNOFF POND
PLAN AND SECTIONS

PROJECT NO. M3-PN 140129
DWG NO. 350-CI-008
REV NO. P3
DATE 07 JAN 16

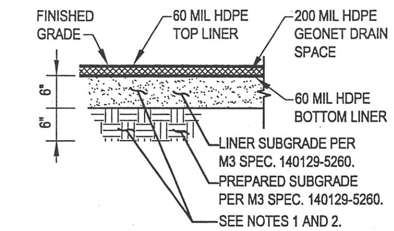
REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE
350-CI-001	COVER SHEET		
350-CI-009	POND DETAILS		

NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE: 1"=40'		DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

m3 ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT M3ENG.COM

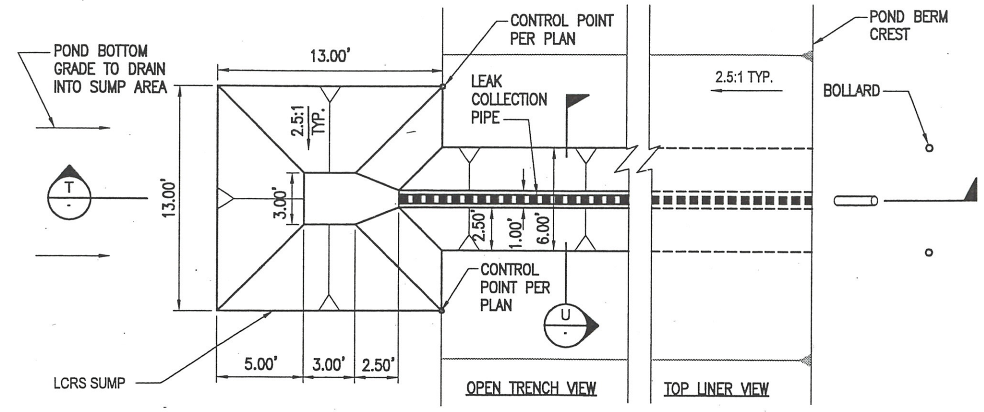
File: P:\2014\140129\CIVIL (544)\544.2 Dwgs\350-CI-008.dwg LAST UPDATE: 1/6/2016 4:13 PM BY: DV1684



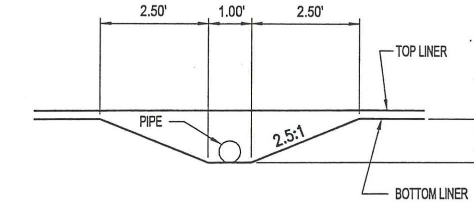
TYPICAL PROCESS SOLUTION POND LINER (1)
NTS

NOTES:

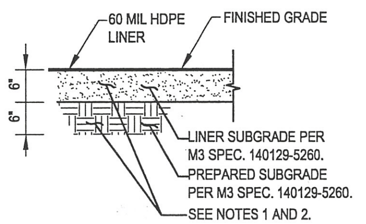
1. OVEREXCAVATE POND TO A DEPTH OF 12" BELOW FINISHED GRADE, ADD MOISTURE, BACKFILL AND COMPACT TO A MIN. OF 95% OF THE MAX. STANDARD PROCTOR DRY DENSITY PER ASTM D698.
2. REFER TO M3 SPECIFICATION 140129-5260 FOR EARTHWORK ADJACENT TO LINER.



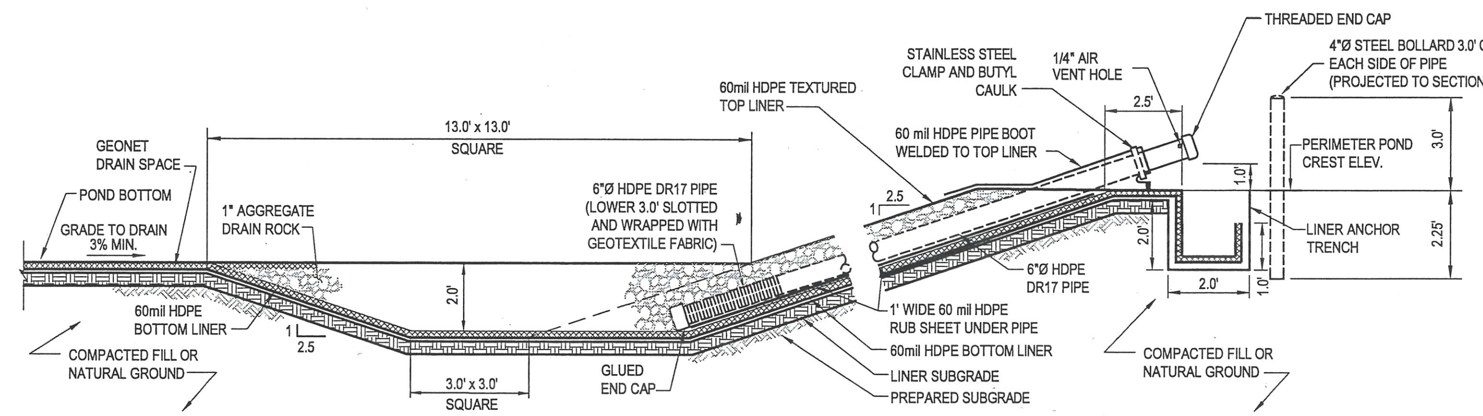
PROCESS SOLUTION POND - LCRS SUMP PLAN (5)
NTS



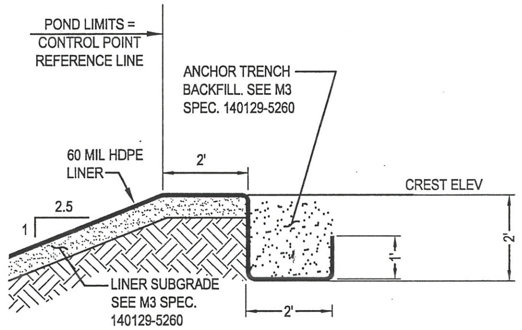
SECTION (U)
NTS



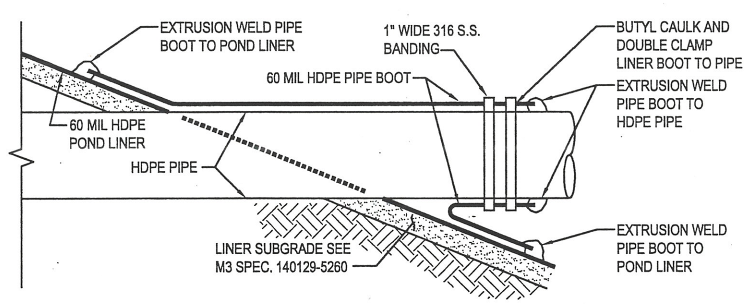
TYPICAL NON-STORM WATER POND LINER (2)
NTS



PROCESS SOLUTION POND - LEAK COLLECTION (T)
NTS



LINER ANCHOR DETAIL (3)
N.T.S.



LINER PIPE BOOT DETAIL (4)
N.T.S.

Registered Professional Engineer (Civil)
CERTIFICATE NO. 40221
CRAIG A. HUNT
DATE SIGNED 1-11-16
ARIZONA U.S.A.
Craig A. Hunt
EXPIRES: 12-31-18

FIGURE K-9

DO NOT SCALE 11x17 DRAWINGS

JANUARY 2016 APP APPLICATION

Excelsior MINING ARIZONA, INC

GUNNISON COPPER PROJECT

SOLUTION PONDS
CIVIL
POND DETAILS

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	AS NOTED	DATE
DESIGNED BY	CAH	NOV 15
DRAWN BY	DMV	NOV 15
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

m3 ARCHITECTURE ENGINEERING CONSTRUCTION MANAGEMENT

PROJECT NO. M3-PN 140129
DWG NO. 350-CI-009
REV NO. P3
DATE 07 JAN 16

File: P:\2014\140129\CIVIL (544)\544.2 Dwgs\350-CI-009.dwg LAST UPDATE: 1/7/2016 7:35 AM BY: DV4684

EXHIBIT K-1

TECHNICAL MEMORANDUM –

"SLOPE STABILITY ANALYSIS, GUNNISON COPPER"
TERRACON CONSULTANTS, INC., DATED NOVEMBER 25, 2015

November 25, 2015

Excelsior Mining Corporation
1140 West Pender Street
Suite 1240
Vancouver, BC Canada V6E 4G1

c/o M3 Engineering and Technology Corporation
2051 West Sunset Road
Tucson, Arizona 85704

Attn: Mr. Craig Hunt, P.E.

Re: **Slope Stability Analyses**
Gunnison Copper
South of I-10, East of Johnson Road
Cochise County, Arizona
Terracon Project No. 63145060

Dear Mr. Hunt:

At your request, Terracon Consultants, Inc. (Terracon) has completed global stability analyses of the proposed embankments at Gunnison Copper located in Cochise County, Arizona. These services were undertaken in general accordance with the Agreement for Services, Terracon Reference Number P63140375, Revision No. 2, dated December 23, 2014. The purpose of our services is to provide global stability analyses of the proposed embankments based on the embankment geometry provided by M3 Engineering for the project. This report provides the results of our analyses and recommendations.

Documents Provided for Review: We were provided with the following documents for the completion of our engineering services:

- Preliminary Embankment Cross Sections, PLS Pond, Evaporation Pond, and Solids Impoundment, provided by M3 Engineering, received via email on November 18, 2015;
- Geotechnical Engineering Report, Gunnison Copper, by Terracon Consultants, Inc., Terracon Project No. 63145060, dated May 13, 2015.

Engineering Design Analyses: The three (3) proposed embankment slopes will be located at the PLS Pond, the Evaporation Pond, and at the Solids Impoundment area at the proposed Gunnison Copper facility. The embankments will range in height from 23 feet to 44 feet. Based on the correspondence with M3 Engineering, all three embankments will have a 2.5H:1V interior slope, a 2H:1V exterior slope, a 25 foot wide embankment crest, and the interior slope will be double-lined with a leak collection system.

Geotechnical Engineering Data: A summary of the soil parameters used in our stability analyses, based on the Terracon Geotechnical Engineering Report, are shown in the following table:

Slope Location	Soil Type	Friction Angle (deg)	Unit Weight (pcf)	c (psf)
PLS Pond	Fill	33	120	0
	Silty Sand	33	115	0
	Silty Sand with Gravel	37	120	0
Evaporation Pond	Fill	33	120	0
	Clayey Sand with Gravel	32	115	0
	Silty Sand with Gravel	37	120	0
Solids Impoundment	Fill	33	120	0
	Clayey Sand with Gravel	35	115	0

Global Stability Analyses: As requested, Terracon conducted global stability analyses based on the embankment geometries provided by M3 Engineering and the geotechnical engineering parameters shown above. Terracon analyzed global stability of the maximum slope section for both the interior and exterior slopes. For seismic conditions a pseudo-static horizontal earthquake coefficient of 0.07 was applied in the analyses. The interior slopes were analyzed with a two (2) foot freeboard. The analyzed geometries and resulting factors of safety against global instability are summarized in the following table:

Slope Location	Interior Slope Height (ft)	Interior Slope Ratio	Interior Slope Factor of Safety		Exterior Slope Height (ft)	Exterior Slope Ratio	Exterior Slope Factor of Safety	
			Static	Pseudo-Static			Static	Pseudo-Static
PLS Pond	22	2.5H:1V	2.18	1.45	23.5	2H:1V	1.92	1.56
Evaporation Pond	30	2.5H:1V	1.88	1.29	24.5	2H:1V	1.71	1.39
Solids Impoundment	28	2.5H:1V	1.87	1.28	44	2H:1V	1.53	1.30

The graphical results of the global stability analyses are attached to this report. Normally accepted minimum factors of safety against global instability are 1.5 and 1.125 for static and pseudo-static seismic conditions, respectively. These minimum values would also be applicable in the event that these embankments fall under the jurisdiction of the dam safety division of the Arizona Department of Water Resources (ADWR). The results of the stability analyses show that the minimum generally accepted factors of safety have been met for all cases.

Terracon

The analyses also indicated factors of safety less than 1.3 for shallow surficial failures on the 2H: 1V exterior slopes. We recommend some form of slope protection to control erosion or shallow surficial failures on the face of the exterior slopes should be included in the design and construction.

Additional Consultation: We are available to discuss the details of our stability analyses with you. Please call should further consultation be required.

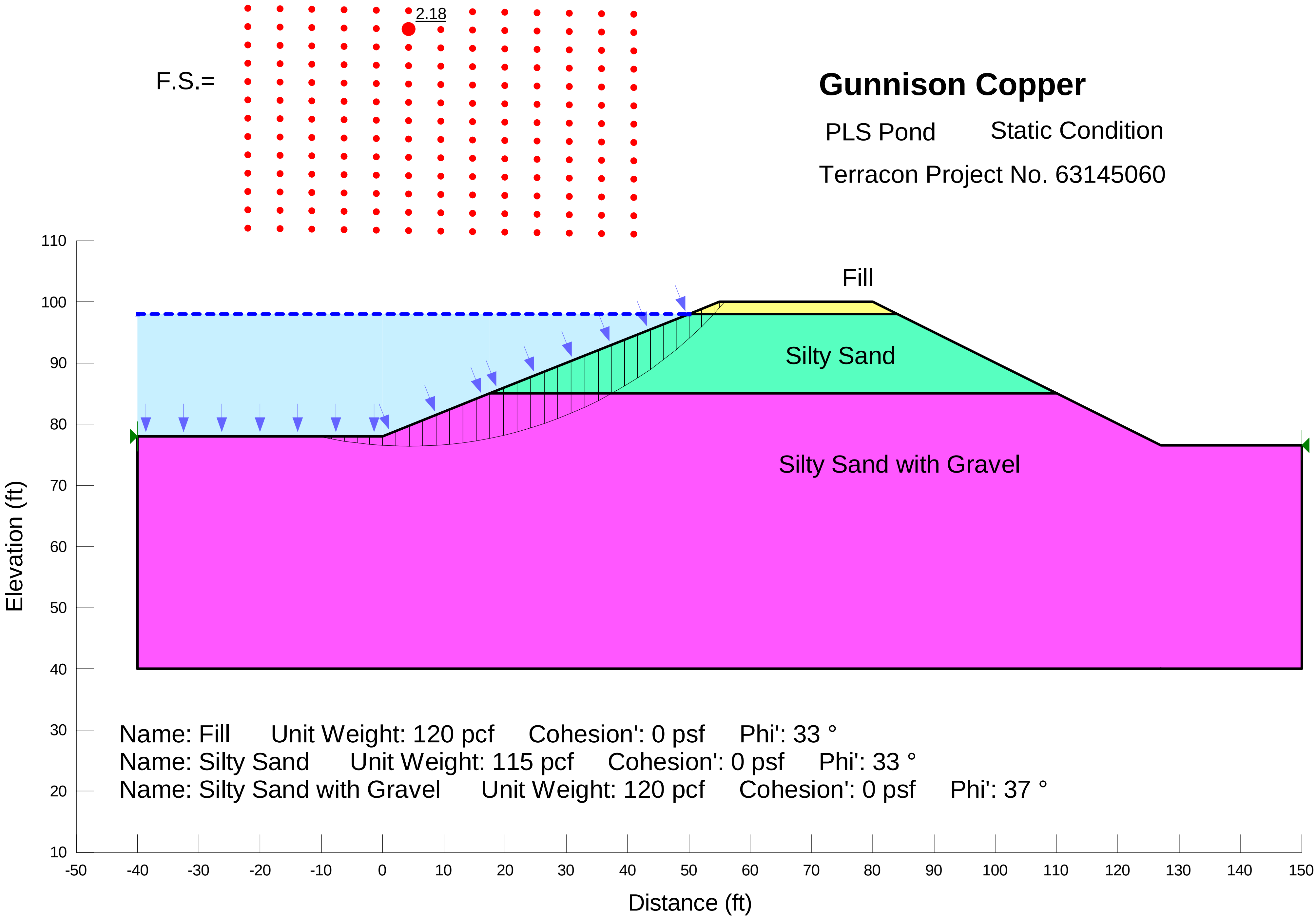
Sincerely,
Terracon Consultants, Inc.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
57455
LAURA M.
SPENCER
Date Signed 11-25-15
ARIZONA, U.S.A.
EXPIRES 6/30/2017

Laura M. Spencer, Ph.D., P.E.
Senior Staff Engineer

Donald R. Clark, P.E.
Senior Consultant

Copies to: Addressee (one electronic copy)

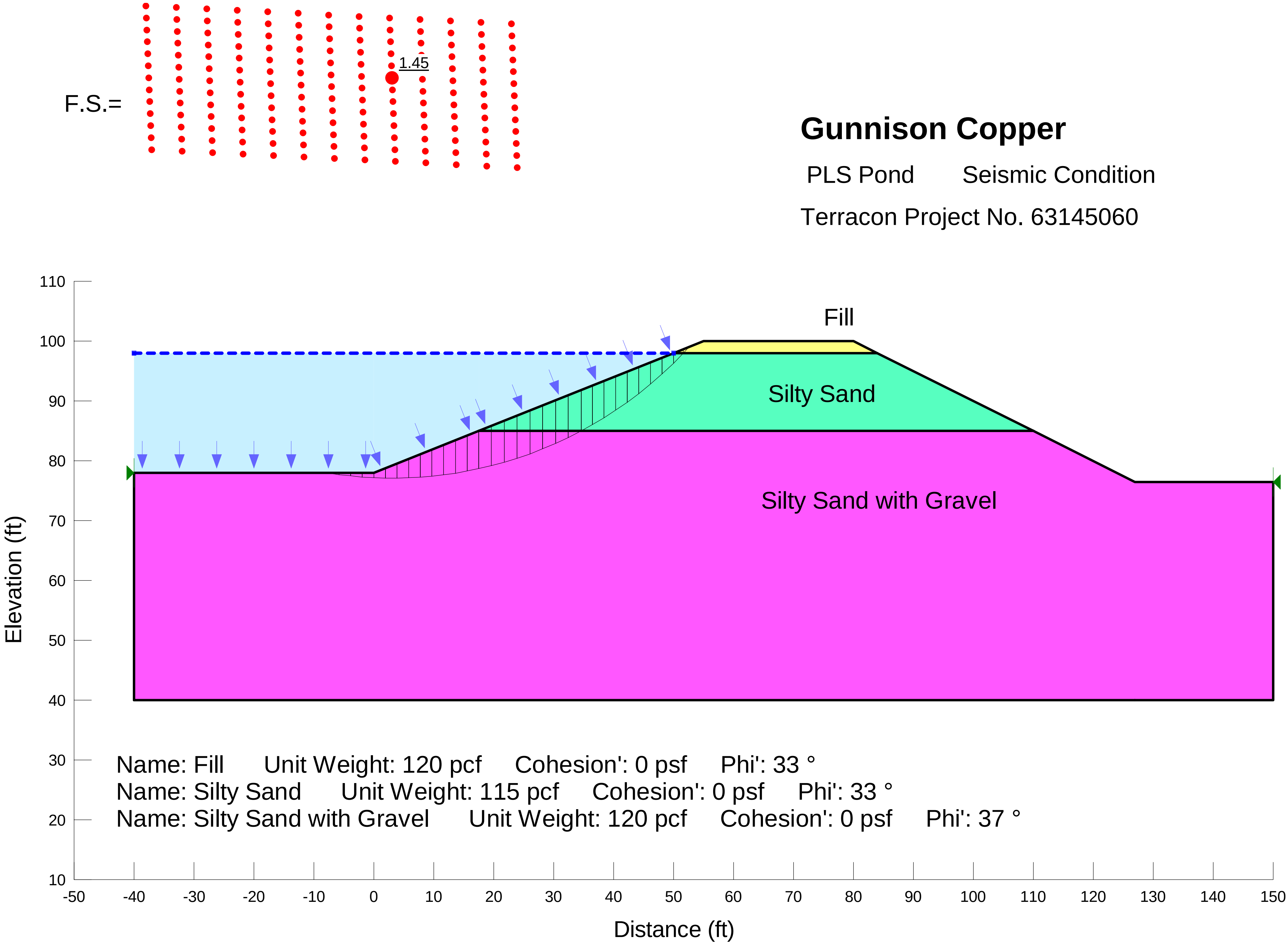


F.S.=
2.18
Gunnison Copper
PLS Pond
Static Condition
Terracon Project No. 63145060
Fill
Silty Sand
Silty Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Silty Sand Unit Weight: 115 pcf Cohesion': 0 psf Phi': 33 °
Name: Silty Sand with Gravel Unit Weight: 120 pcf Cohesion': 0 psf Phi': 37 °
Elevation (ft)
Distance (ft)
110
100
90
80
70
60
50
40
30
20
10
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150

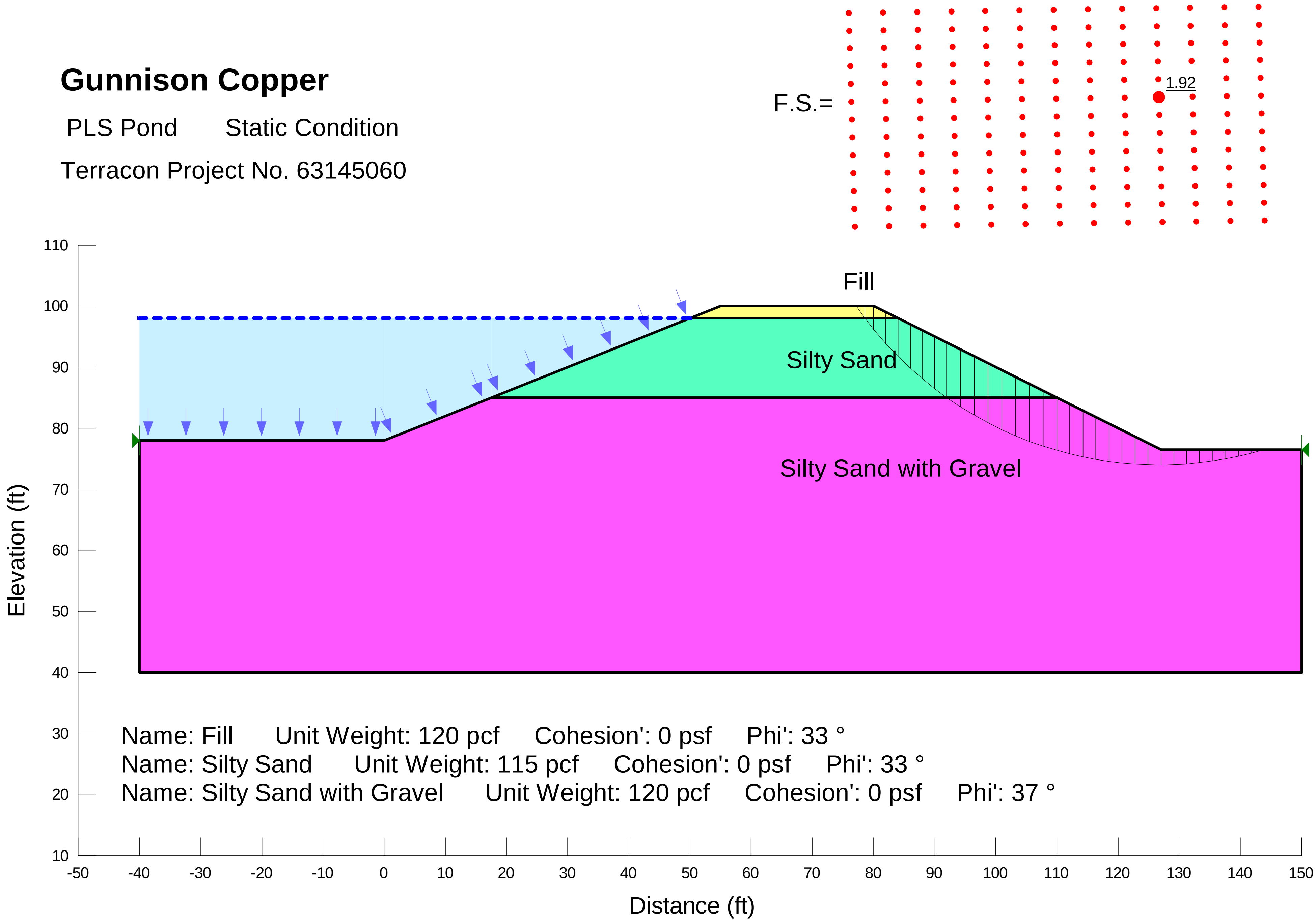
Gunnison Copper

PLS Pond Seismic Condition

Terracon Project No. 63145060



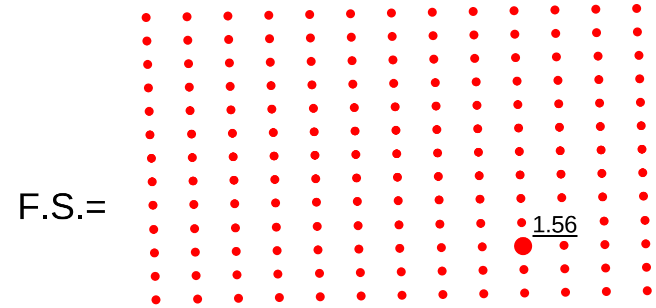
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Silty Sand Unit Weight: 115 pcf Cohesion': 0 psf Phi': 33 °
Name: Silty Sand with Gravel Unit Weight: 120 pcf Cohesion': 0 psf Phi': 37 °

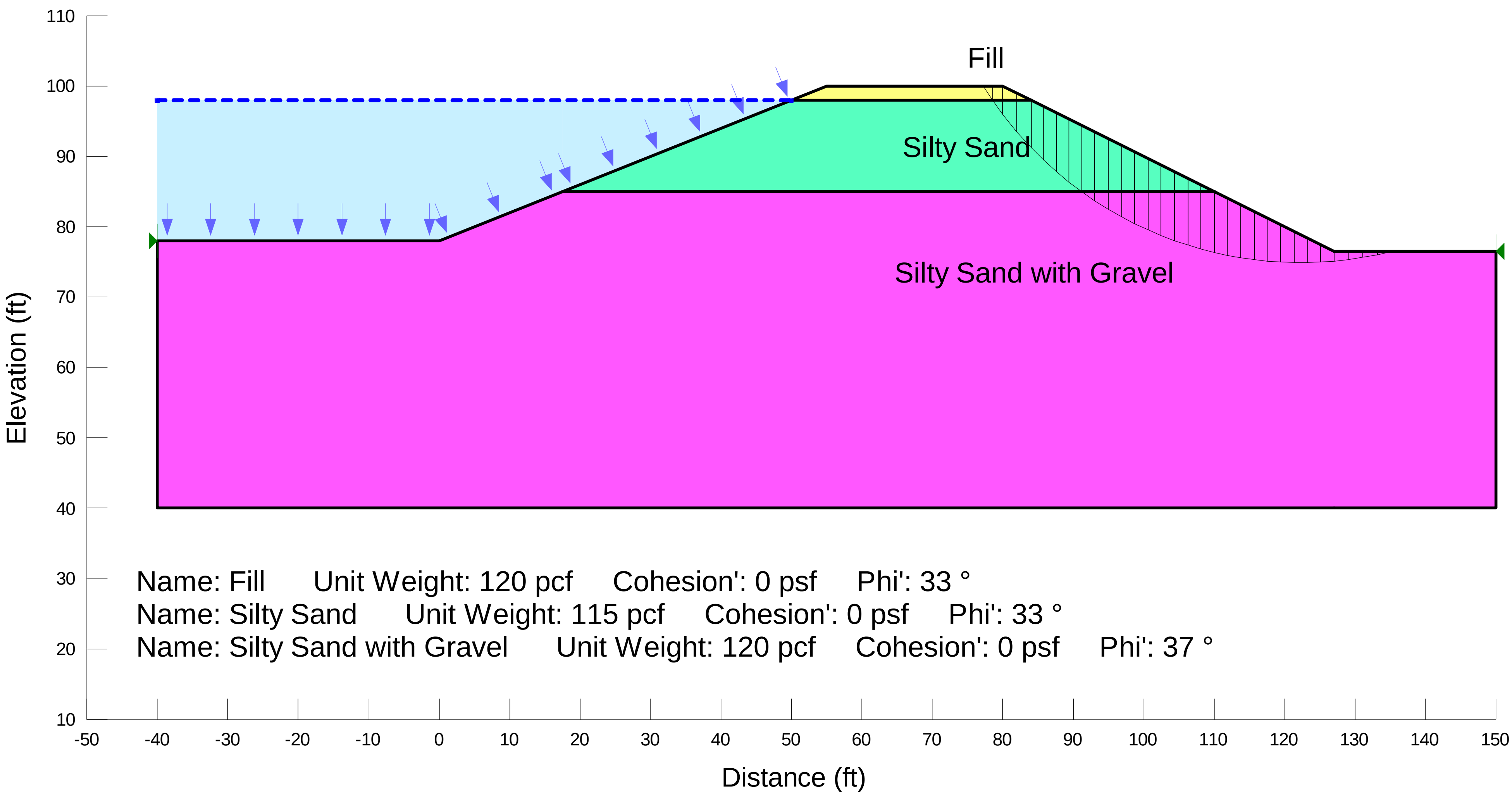

Gunnison Copper
PLS Pond
Static Condition
Terracon Project No. 63145060
F.S.=
1.92
Fill
Silty Sand
Silty Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Silty Sand Unit Weight: 115 pcf Cohesion': 0 psf Phi': 33 °
Name: Silty Sand with Gravel Unit Weight: 120 pcf Cohesion': 0 psf Phi': 37 °
Elevation (ft)
110
100
90
80
70
60
50
40
30
20
10
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Distance (ft)

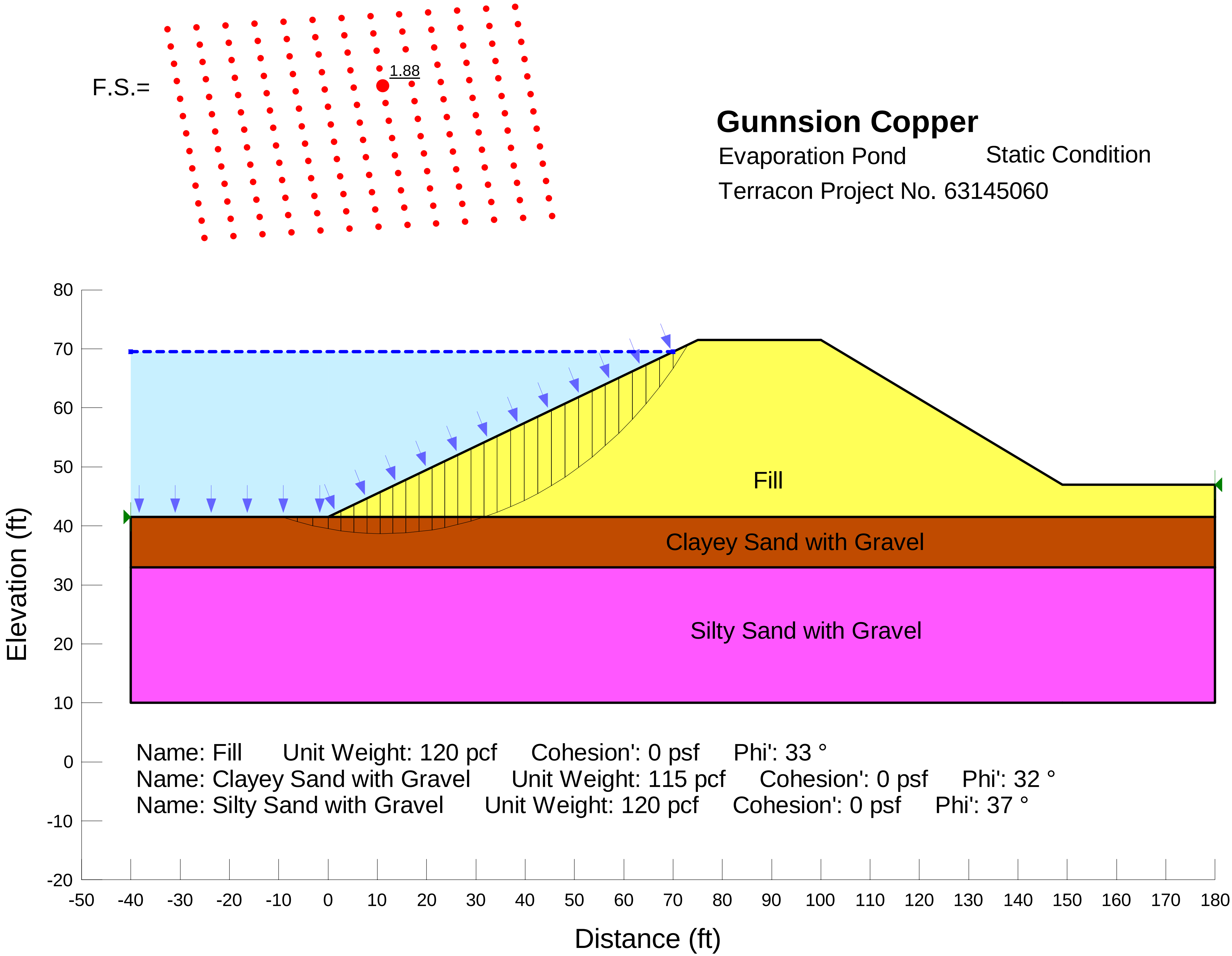
Gunnison Copper

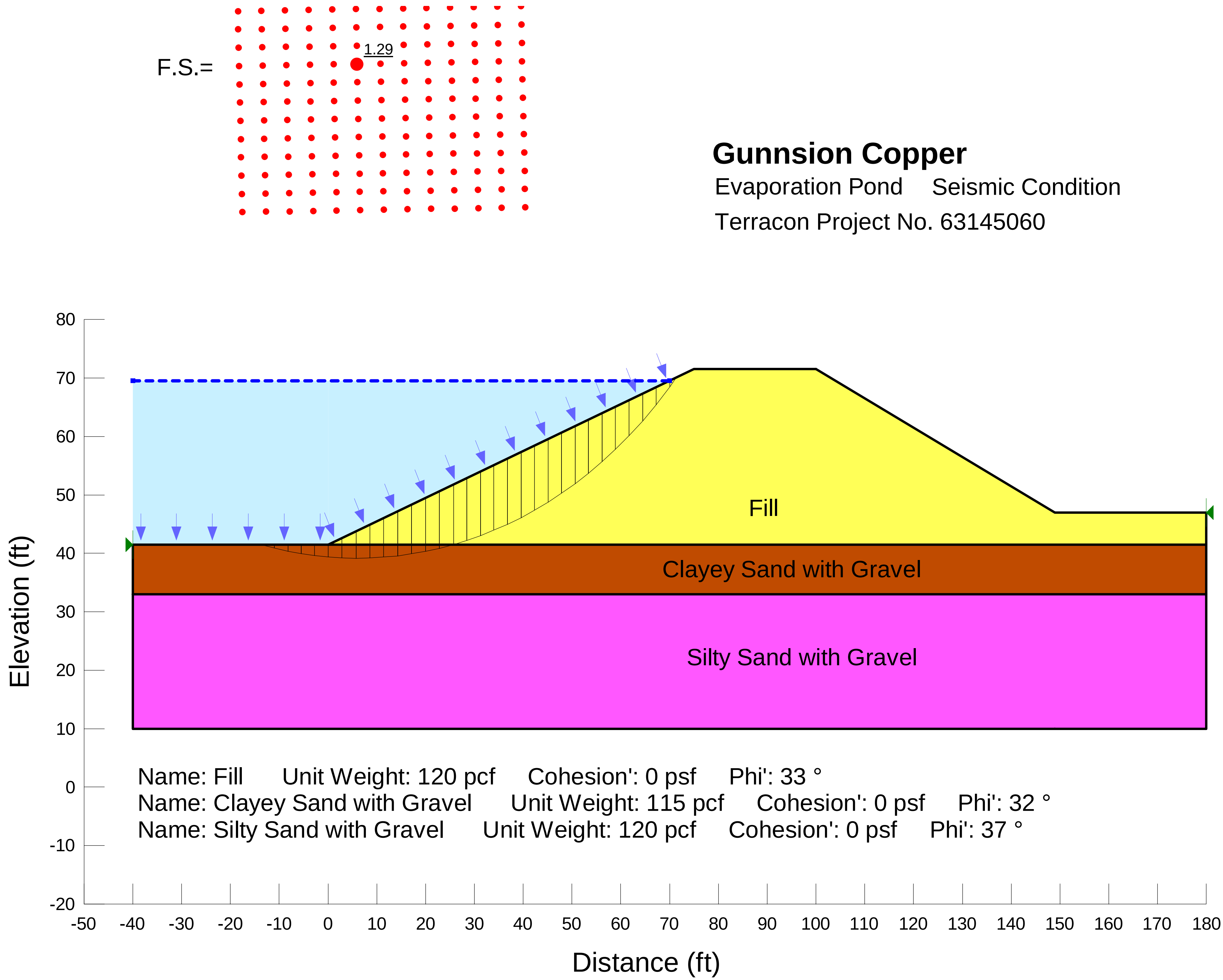
PLS Pond Seismic Condition

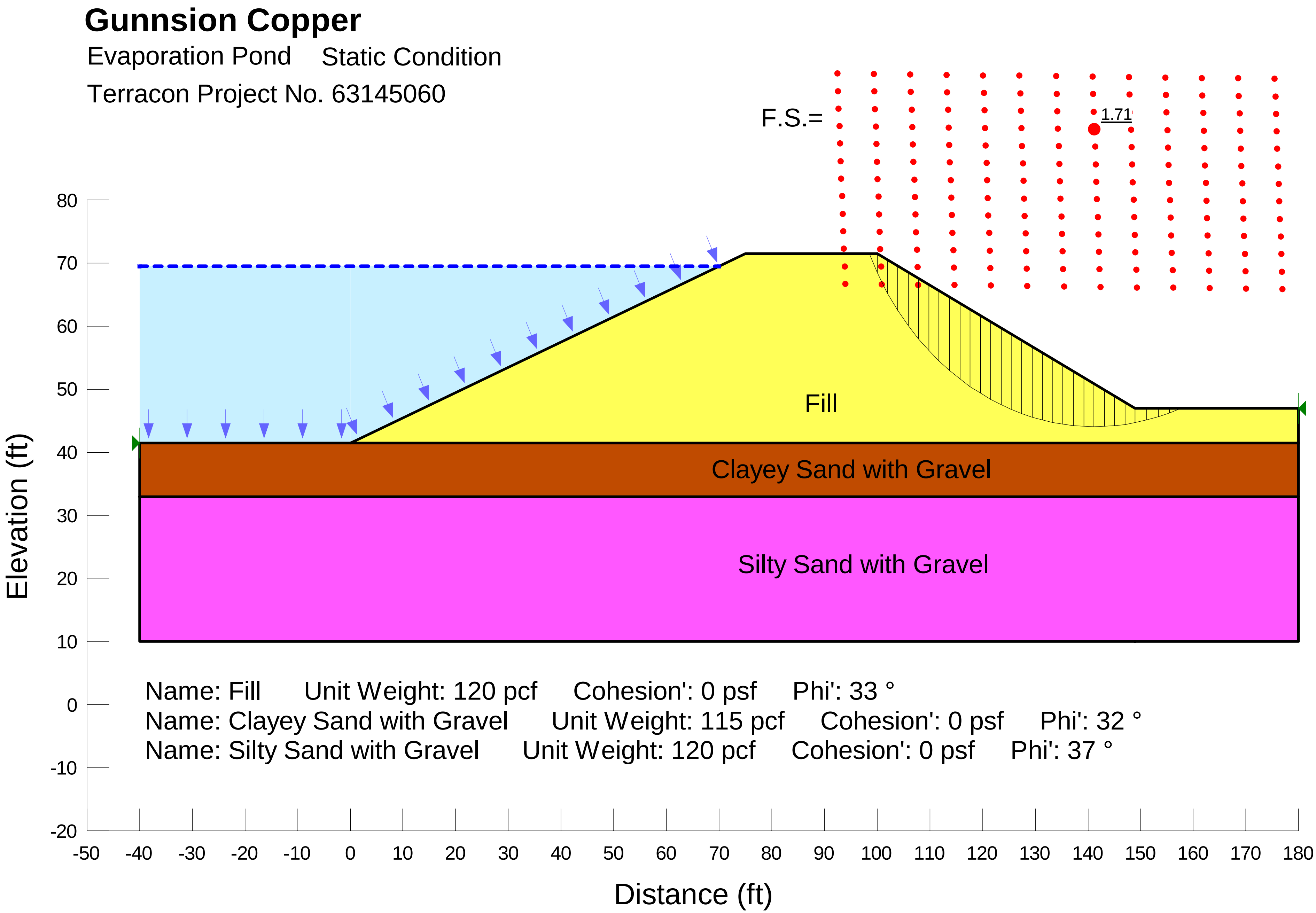
Terracon Project No. 63145060



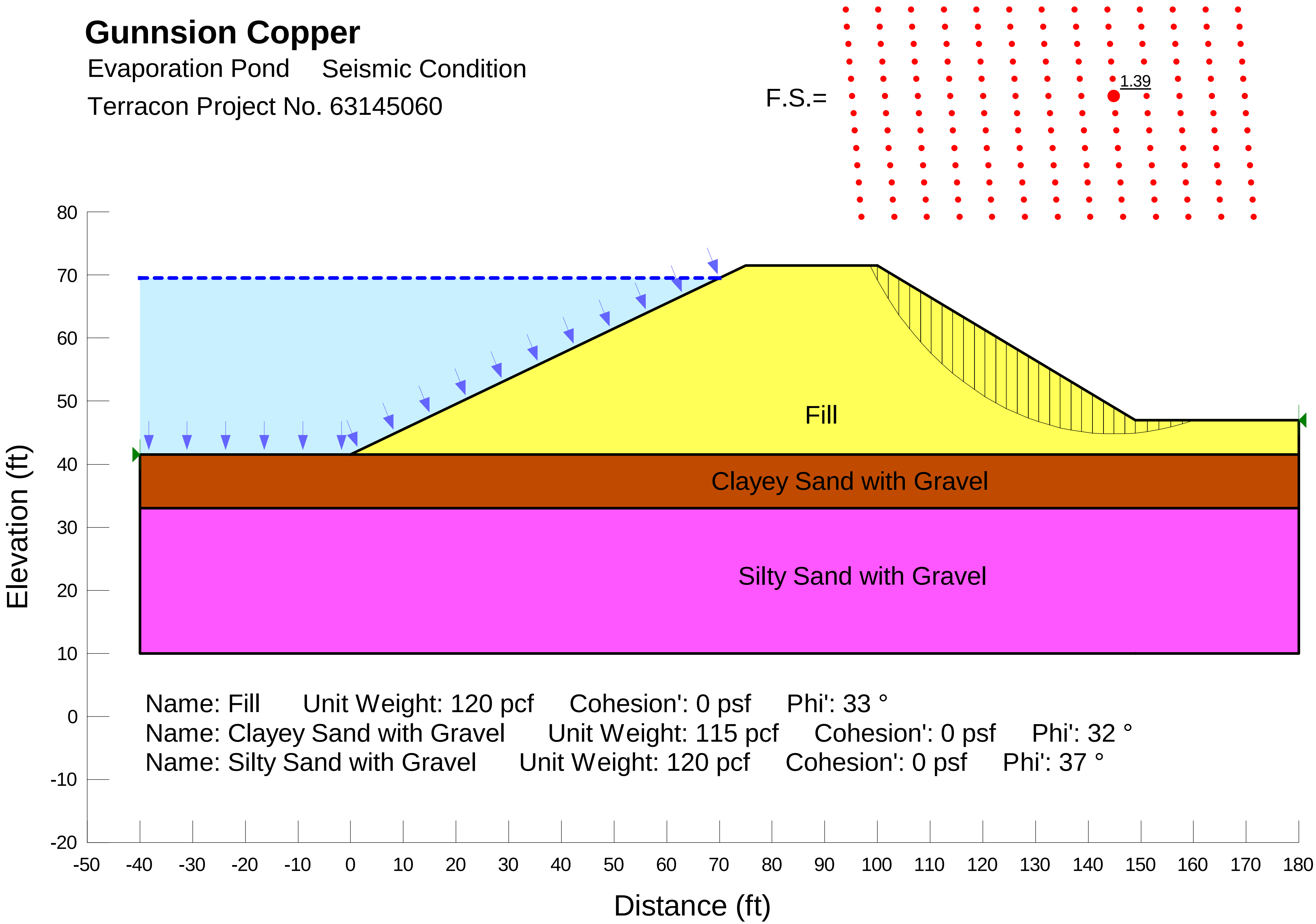



F.S.=
1.88
Gunnsion Copper
Evaporation Pond
Static Condition
Terracon Project No. 63145060
Fill
Clayey Sand with Gravel
Silty Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Clayey Sand with Gravel Unit Weight: 115 pcf Cohesion': 0 psf Phi': 32 °
Name: Silty Sand with Gravel Unit Weight: 120 pcf Cohesion': 0 psf Phi': 37 °
Elevation (ft)
Distance (ft)
80
70
60
50
40
30
20
10
0
-10
-20
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180

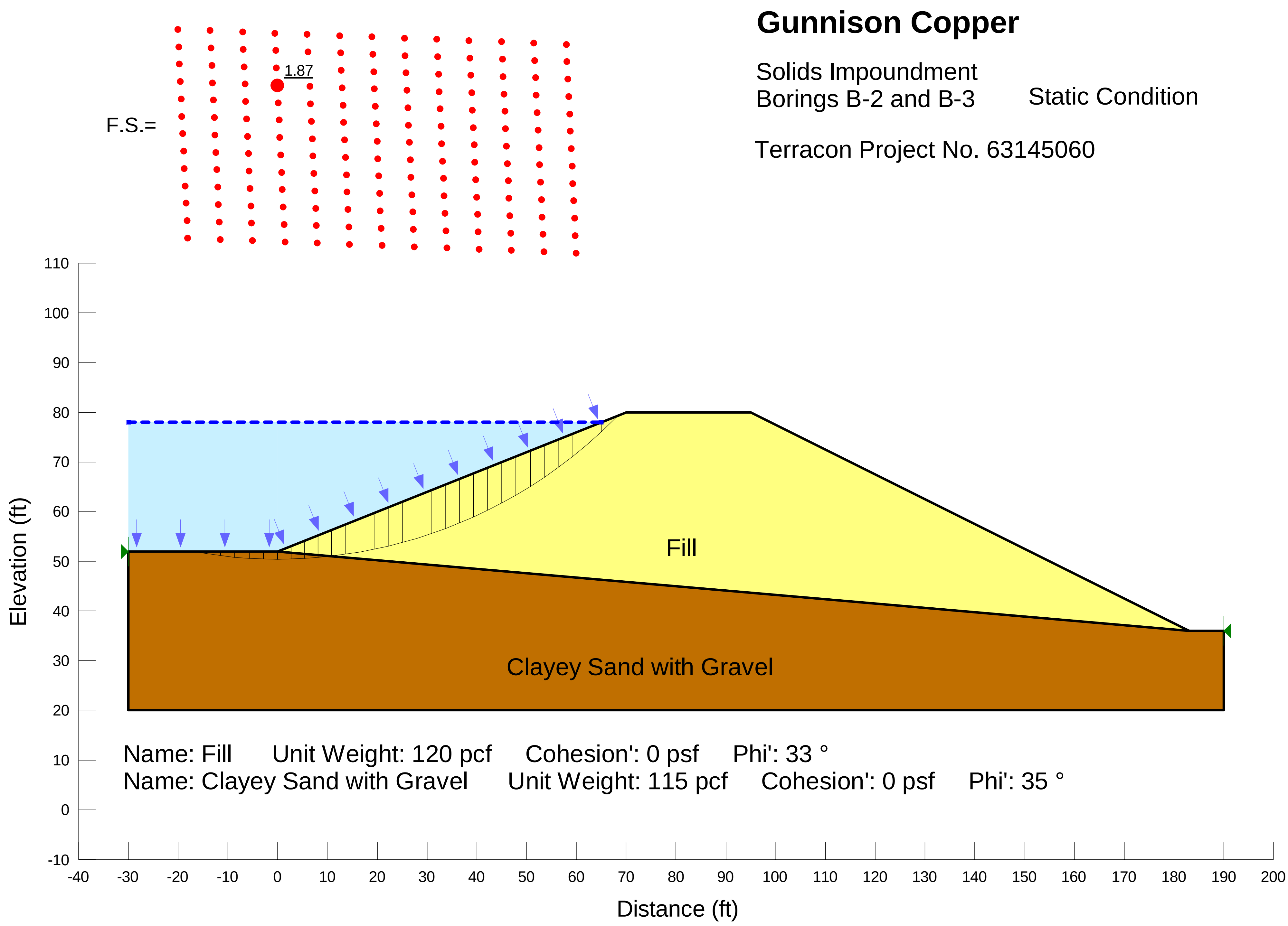

F.S.=
1.29
Gunnsion Copper
Evaporation Pond Seismic Condition
Terracon Project No. 63145060
Fill
Clayey Sand with Gravel
Silty Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Clayey Sand with Gravel Unit Weight: 115 pcf Cohesion': 0 psf Phi': 32 °
Name: Silty Sand with Gravel Unit Weight: 120 pcf Cohesion': 0 psf Phi': 37 °
Elevation (ft)
Distance (ft)
80
70
60
50
40
30
20
10
0
-10
-20
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180



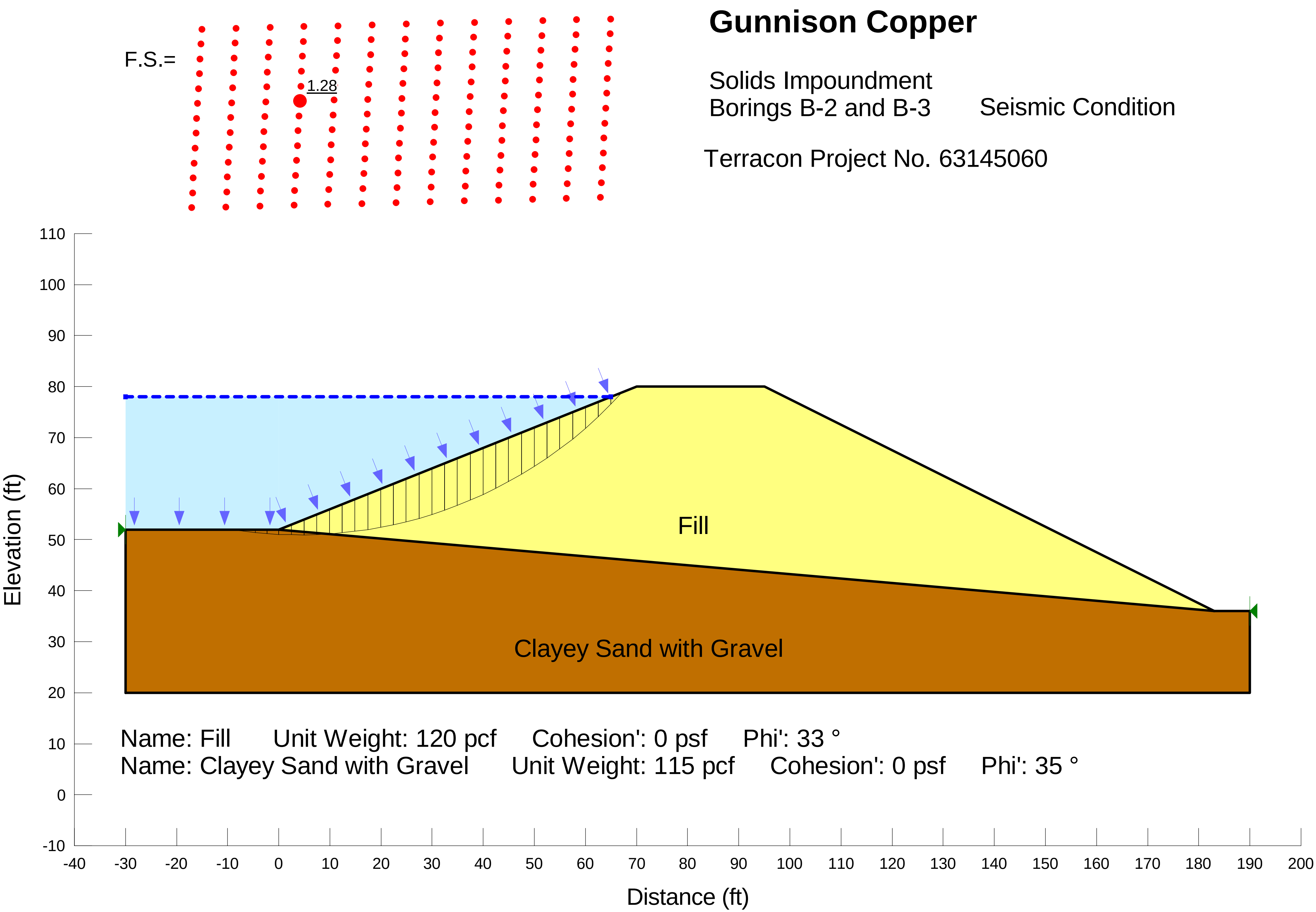
Gunnsion Copper
Evaporation Pond
Static Condition
Terracon Project No. 63145060
F.S.=
1.71
Fill
Clayey Sand with Gravel
Silty Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Clayey Sand with Gravel Unit Weight: 115 pcf Cohesion': 0 psf Phi': 32 °
Name: Silty Sand with Gravel Unit Weight: 120 pcf Cohesion': 0 psf Phi': 37 °
Elevation (ft)
80
70
60
50
40
30
20
10
0
-10
-20
Distance (ft)
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180

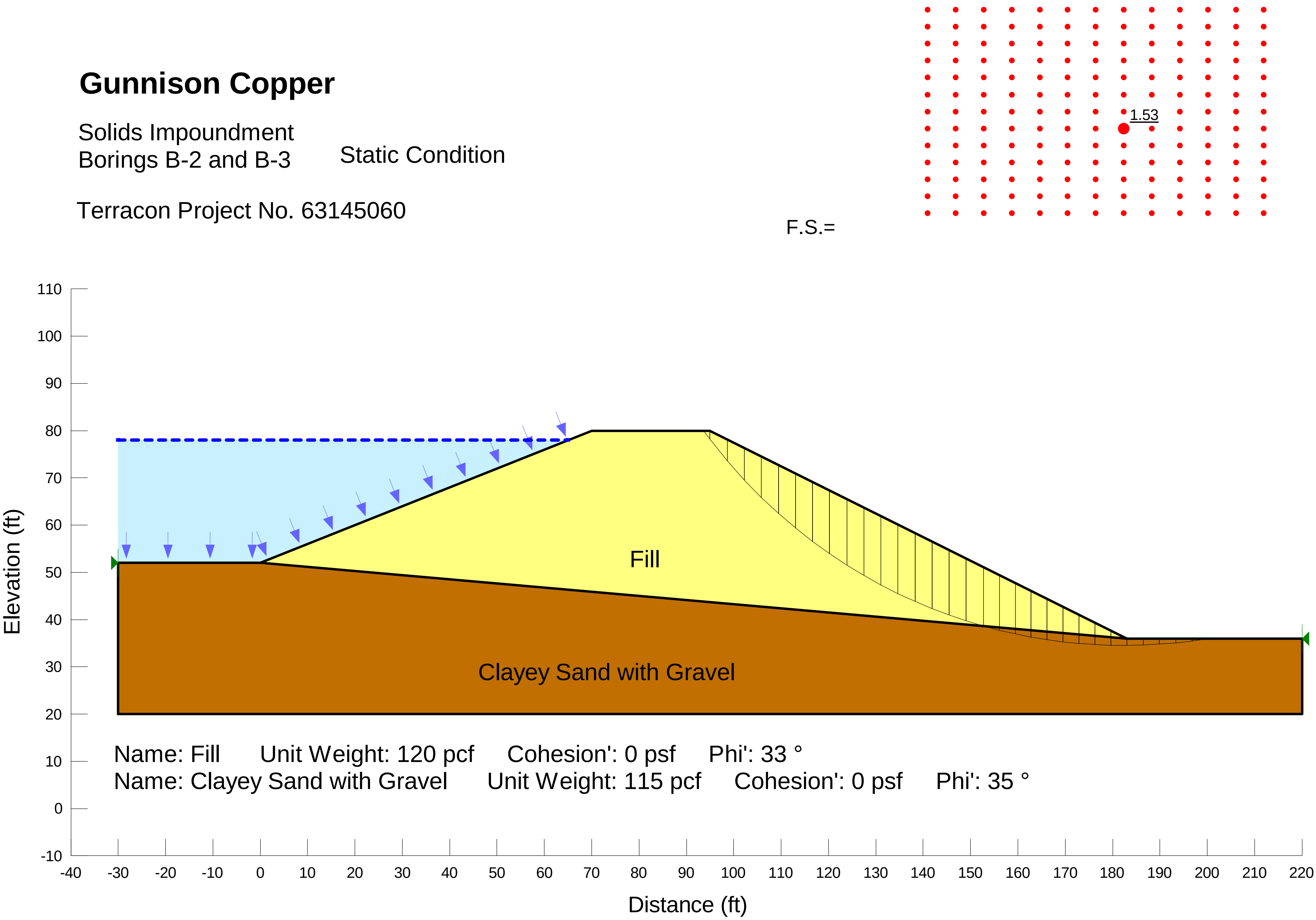


Gunnsion Copper
Evaporation Pond
Seismic Condition
Terracon Project No. 63145060
F.S.=
1.39
Fill
Clayey Sand with Gravel
Silty Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Clayey Sand with Gravel Unit Weight: 115 pcf Cohesion': 0 psf Phi': 32 °
Name: Silty Sand with Gravel Unit Weight: 120 pcf Cohesion': 0 psf Phi': 37 °
Elevation (ft)
80
70
60
50
40
30
20
10
0
-10
-20
Distance (ft)
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180



Gunnison Copper
Solids Impoundment
Borings B-2 and B-3
Static Condition
Terracon Project No. 63145060
F.S.=
1.87
Fill
Clayey Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Clayey Sand with Gravel Unit Weight: 115 pcf Cohesion': 0 psf Phi': 35 °
Elevation (ft)
Distance (ft)
110
100
90
80
70
60
50
40
30
20
10
0
-10
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200


Gunnison Copper
Solids Impoundment
Borings B-2 and B-3
Seismic Condition
Terracon Project No. 63145060
F.S.=
1.28
Fill
Clayey Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Clayey Sand with Gravel Unit Weight: 115 pcf Cohesion': 0 psf Phi': 35 °
Elevation (ft)
Distance (ft)
110
100
90
80
70
60
50
40
30
20
10
0
-10
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200


Gunnison Copper
Solids Impoundment
Borings B-2 and B-3
Static Condition
Terracon Project No. 63145060
F.S.=
1.53
Fill
Clayey Sand with Gravel
Name: Fill Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Clayey Sand with Gravel Unit Weight: 115 pcf Cohesion': 0 psf Phi': 35 °
Elevation (ft)
Distance (ft)
110
100
90
80
70
60
50
40
30
20
10
0
-10
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220

Gunnison Copper

Solids Impoundment
Borings B-2 and B-3

Seismic Condition

Terracon Project No. 63145060